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Monitoring Times[®]

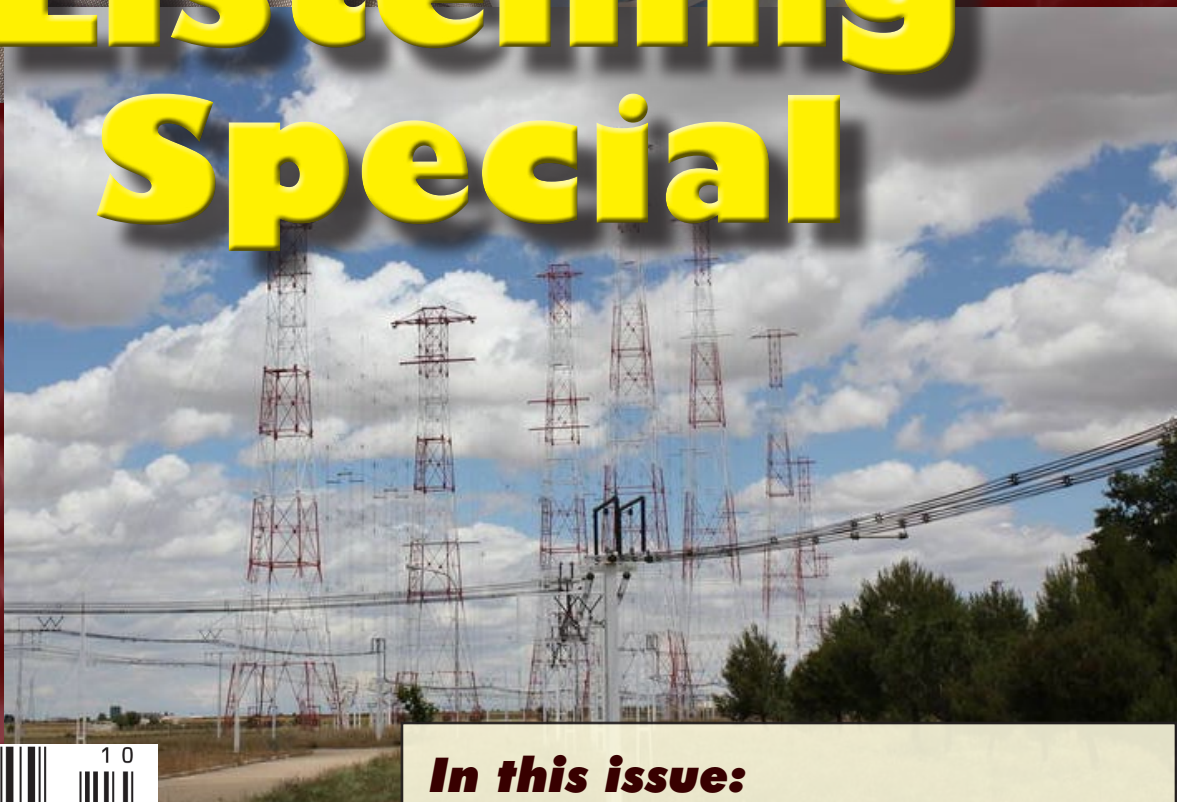
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Shortwave Listening Special



In this issue:

- Building Ten-Tec's 1253 Shortwave Receiver
- Make Your Own All-band HF DX Loop
- MT Reviews: Uniden's HomePatrol-1™

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Monitoring Times

Vol. 29 No. 10

October 2010



Shortwave Listening Special 8

This month *MT* celebrates the return of the fall/winter shortwave DX season with an all-shortwave issue.

Despite what you might have heard, shortwave radio is still very much alive. And, like so many other communications institutions today, international shortwave broadcasters are feeling their way into the future. In his cover story, "Whatever Happened to Wireless," Eric Bryan notes that change is the only constant in the world of radio. Even so, his list of countries, still regularly broadcasting programs in English to North America, totals more than 40.

Eric also provides a list of all the frequencies of the countries that are transmitting in Digital Radio Mondiale (DRM), the digital radio broadcast format emerging as the future for HF. He also notes which broadcasters are available on World Radio Network's vast multi-platform service; which stations provide online streaming; those that provide for online reception reports, as well as notes on programs that might be of particular interest to listeners.

On Our Cover

Radio studio of international shortwave broadcaster Deutsche Welle (Courtesy: Deutsche Welle); Shortwave antenna for Radio Exterior de España (Courtesy: Radio Exterior de España)

C O N T E N T S

Ten-Tec 1253: A Great First Radio Project! 13

By Robert Gulley AK3Q

If you thought the era of radio kit building passed you by, Robert Gulley AK3Q would like to tell you otherwise. Robert reports that this nine-band regenerative receiver kit from Ten-Tec is simple enough for those who have never built anything before, yet challenging enough for old hands. Robert says, "This project has truly given me a deeper appreciation for those who came before us."

An Easy-to-Build All-Band HF Loop Antenna 16

By Bob Patterson K5DZE

An 80 through 10 meter antenna that outperforms the vaunted all-band dipole and makes a terrific shortwave listening antenna? "Yes!" says Bob Patterson K5DZE. Not only that, but this 265 foot antenna may not be as big as it seems. That's the beauty of the loop: it's only 66 feet on a side, small enough to fit on many town lots!

A Most Unlikely Radio Career 18

By Keith Perron

Following his dream to be an international radio broadcaster, Canadian Keith Perron's twenty year career has taken him from Radio Canada International to a local FM station in Taiwan. But along the way Keith found himself on the staff at Radio Havana, China Radio International and even a Chinese AM station in western Canada. Keith details his journey and lets us know what's next in this most unlikely radio career.

R E V I E W S

The Revolution Has Begun 66

Uniden's HomePatrol-1™

By Larry Van Horn N5FPW, MT Review Editor

Are you looking for a scanner that can tune analog, trunked, and digital public service transmissions without having to know any more about programming such a receiver than your own ZIP code? Then, Uniden's latest scanner, the HomePatrol-1 is for you!

Larry has been following this revolutionary development in scanner technology since it was announced this past June. Now that he's had

a chance to actually use it, Larry reports that he's so impressed with this product he gives it 4 ¾ stars out of five. He adds, "Not many things in this world can be called true game changers, but the new HomePatrol-1 is the exception and has indeed made scanning simple again."



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COMMUNICATIONS

by Ken Reitz



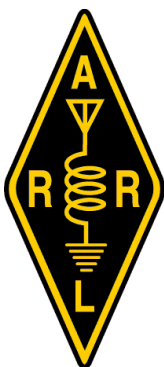
AMATEUR RADIO/SHORTWAVE

League Warns OK Town on "Nuisances"

Proving that local lawmakers have way too much time on their hands, Midwest City, Oklahoma, had a local ordinance on the books banning as a nuisance "operating or using any electrical apparatus or machine which materially and unduly interferes with radios or television reception by others."

According to an ARRL report, a local Midwest City ham received a letter threatening sanctions (a minimum \$100 fine and/or 15 days in jail plus the confiscation of equipment to be sold to pay for alleged damages) if claimed interference by a neighbor wasn't fixed in one day. The ham in question notified the League whose General Counsel wasted no time coming to his defense, notifying Midwest City officials that "such regulation is exclusively within the jurisdiction of the Federal Communications Commission and all regulation of radio transmission and interference phenomena is preempted by Federal law."

According to a related story in the *Oklahoman*, city attorneys didn't return the reporter's calls regarding the case, but an e-mail from the assistant City Attorney explained that the city had rescinded the complaint against the ham and will direct any future complaints of interference to the FCC. Case closed.



Sudan Ousts BBC FM Outlets in North

Among excuses international shortwave broadcasters give for no longer providing shortwave coverage to many parts of the world is that brokered time on local AM and FM outlets in-country make such shortwave broadcasts redundant. But, a story from the *Associated Press* on August 9 shows the danger of that policy. According to the article, the government of Sudan, headed by a man wanted by the International Criminal Court on genocide charges, has suspended BBC broadcasts in Arabic via FM stations in the north of the country for what it termed "license violations." Of course, the government denied the suspension had anything to do with content of the broadcasts, but human rights groups tell of a clamp-down on expression throughout the country. Luckily, BBC's Arabic service is still available to that region via shortwave.

AM/FM/TV BROADCASTING

Wind Topples 3 WWVA Towers

Three self-supporting 400 foot towers that comprise the 50,000 watt AM array for WWVA (1170 kHz) Wheeling, West Virginia, were brought down during straight line winds ahead of a severe thunderstorm that swept through a three-state area the afternoon of August 4. According to the station's web site, the towers, said to have survived the past 60 years and which reportedly fell independently, stretched out across the St. Clairsville, Ohio countryside in spectacular fashion.



One of three 400' WWVA towers on the ground after wind storm (Courtesy: WWVA-AM)

The incident left 1170 kHz quiet for a short time, enabling AM band DXers in the East a rare opportunity to log KFAQ-AM Tulsa, Oklahoma.

WWVA was back on the air, operating on reduced power with a temporary antenna, within six hours of the disaster, but was knocked off again shortly after that. By late morning on August 6th the station was again on the air at reduced power. The all-news/talk station, once the musical icon of West Virginia's cultural heritage, is owned by Clear Channel.

Station Totals Released

The FCC updated its broadcast station count as of June 30. There were a total of 30,855 broadcast TV and radio stations in the U.S., an increase of 189 stations from the last data released at the end of March. On the radio side there were 4,786 AM stations (down 4 from the previous quarter); 6,494 commercial FM stations (a gain of 9); 3,223 non-commercial FM stations (a gain of 43), and 864 LPFM stations (a loss of one). FM translators and boosters numbered 6,168.

Dude, Choppers at 6 o'Clock!

National Public Radio reported June 8 on an unusual broadcast service of community radio station KMUD-FM, located in Humboldt County, California, home to extensive legal and

illegal pot growing operations. According to the story, the station has provided regular alerts regarding air and ground traffic that may be part of police enforcement activities for many years. The story reports that efforts by local police agencies to curtail the broadcasts have not been successful.

SATELLITE NEWS

Satellite TV Viewers Unhappy

The Better Business Bureau (BBB) handed the satellite-TV industry some figures not likely to appear in their next ad campaigns. BBB reported in early August that it had received more than 53,000 customer complaints against the two satellite TV services. DISH Network (ad slogan: "Best Customer Service"), received 13,000 complaints and DirecTV (ad slogan: "Discover the Difference") had 39,000 complaints filed against it. BBB noted that many complaints stemmed from steep cancellation fees incurred when subscribers attempted to drop the service after the initial teaser subscription rates ended.

But, how does the satellite experience compare with their cable-TV counterparts? According to a spokesperson for the BBB, it received 93,000 complaints over the last three years for the entire cable-TV satellite-TV industry. Comcast received 17,000 complaints and Time-Warner about 11,000. While it might appear that complaints against either satellite or cable-TV are fairly equal, there are about 62 million basic cable-TV subscribers, according to the National Cable & Telecommunications Association, a cable-TV industry group, while satellite TV services account for about half that number of subscribers, according to Satellite Broadcasting and Communications Association, the satellite-TV industry group.

DISH Hits Skids in 2Q

Analysts had predicted a great second quarter for DISH Network with a net gain of some 130,000 subscribers. But, after the numbers were crunched August 9, the number two satellite TV service actually lost 19,000 customers. According to Bloomberg news, many customers, attracted by the \$19.99/month promotional offer, ditched the service once the promo-period was over. Competitor DirecTV added 100,000 subscribers during the same period. But, to put the numbers in perspective, Comcast, just one major cable-TV provider, added 394,000 customers at the same time.



DeLorme Ties GPS with SPOT

The DeLorme Company, makers of GPS units, has introduced a new model, the Earthmate PN-60w, which now features a SPOT satellite communicator built in. But, this unit is not just for emergencies; the PN-60w lets users send text messages to cell phones and e-mail addresses in addition to social networking sites such as Twitter and Facebook. According to DeLorme, text messaging, track progress, and emergency SOS/911 features are all activated via subscriptions from SPOT. Suggested retail price for the product is \$550 plus subscriber fees (\$100/year).



DeLorme PN-60w now with SPOT satellite communications built-in, but at a price. (Courtesy: DeLorme)

FCC ENFORCEMENT

Univision Fined \$1 Million in Payola Scandal

According to a consent decree issued by the FCC in late July, Spanish language media conglomerate Univision agreed to pay \$1 million to resolve allegations that "Univision radio stations or their employees secretly accepted payment from a record label in exchange for the radio stations giving more frequency airplay to the label's artists, without making the disclosures to listeners" as required by law. As part of the consent decree, Univision agrees to abide by current rules regarding gifts, cash and other gratuities, including size and value of such gifts; the appointment of a compliance officer responsible for monitoring and reporting company performance in this regard, and regular training for personnel on payola restrictions.



EchoStar Cited by FCC on "Speculation"

On July 29, the FCC dismissed DISH Network's parent company, EchoStar's application to construct, launch and operate a C-band satellite at 84.9°W. According to FCC documents, over a three year period the company failed to implement five of its licensed satellites. Accusing EchoStar of "speculation," the Commission noted in a Memorandum Opinion and Order, "EchoStar has five authorized but unbuilt satellites... EchoStar cannot file additional applications until it rebuts the presumption that it had engaged in speculative activity." The FCC accused the company of trying to "hold additional orbital resources to the exclusion of others."



QRM from BDA Leads to NOUO

A bi-directional amplifier (BDA), used to boost cell phone frequencies, has led to interference (QRM) with a licensed Sprint/Nextel transmitter in the mobile radio service in New Jersey. FCC field agents, responding to an interference complaint from the company, tracked the signal to the BDA in the basement of a private home used by a Sprint/Nextel customer in order to improve coverage inside his home. The trouble was that he had no license for the BDA, which is widely available via the Internet, hence the Notice of Unlicensed Operations (NOUO).

The Complicated Case of Eddie Floyd

In early August the FCC issued a typical forfeiture order to a certain Eddie Floyd of Carson City, Nevada, for "failing to timely file" a license renewal application for an FM translator station he owned. Originally tagging Floyd for \$7,000, the fine was reduced to \$500. Sounds like anyone would be happy with that outcome. But, there was a problem that prompted the FCC to issue to Floyd, that same day, an Order to Show Cause, Hearing Designation Order and Notice of Apparent Liability for a Forfeiture. What in the world could have gone wrong?

It turns out that back in December 2006, Floyd, described in a U.S. Justice Department news release as a former radio talk show host and Reno businessman, had just pleaded guilty to laundering drug money in a complicated scheme that involved his son, among a few other persons; certain property he owned nearby in California that was used to farm marijuana, and one questionable business in which he swapped drug money for stock in that company. The upshot is that, in the process of filing for renewal and special temporary authority for the station to continue operations while he was in and out of jail and the station was on the market, he kept ticking the wrong box on the forms that asked the licensee if there had been any "adverse final action taken by a court or administrative body in a civil or criminal proceeding." Oops.

So, now Floyd, having served his prison sentence, is looking at not only the \$500 fine for "failure to timely file," which, by now, is looking downright friendly, but he also faces a hearing before the FCC to revoke his station license, determine his eligibility to hold a future FCC license of any kind and, an additional fine of not more than \$37,500 for each of the three instances in which Floyd lied on the forms.

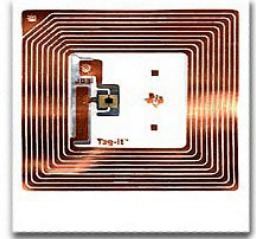
Floyd had been set to sell his translator to Wilks License Company, LLC., an absorber of small market radio stations and no stranger to FCC enforcement. The company received its own Notice of Violation this past spring for splattering signals on no fewer than four places on the FM dial as well as 109.15 MHz, which happened to interfere with the Lubbock Preston Smith International Airport Instrument Landing System.

But, that's not all. It turns out that Wilks owns three FM outlets in the Lubbock area KLLL, KMMX and KONE, all three of which were cited by the FCC for transmitting spurious emissions.

TECHNOLOGY

DIY Passport RFID Reader

Radio Frequency ID (RFID) tags embedded in U.S. passports might be read by a third party from as far as several hundred feet away. That was the report in a *Network World* article from July 29 telling of a demonstration at the Black Hat 2010 show in Las Vegas. A researcher, according to the report, using off-the-shelf items bought in local stores and on eBay totaling less than \$2,500, lashed together a reading device that picked up the data in a U.S. passport from 217 feet away. The article noted that the U.S. government says the embedded chips contain the same information, including the photo, which is found printed in the passport. The article also noted that Canadian passports and New York State driver's licenses use the same chip.



Pandora: 90,000 New Users/Day

An article in *Agence France Presse* from early August reports that Pandora, the free Internet audio service that creates a personalized radio station based on the listener's taste, has reached the 60 million user mark. The article quotes the founder as claiming to get 90,000 new activations per day. Of course, that includes a global market, but it is still an astounding figure.

The article notes, too, that Ford will be integrating Pandora into select models soon. The free service features on-screen and audio ads and allows only 40 hours/month listening time. However, for \$36/year subscribers can listen and watch commercial-free for an unlimited amount of time via a higher quality stream.

"Communications" is compiled by Ken Reitz KS4ZR (kenreitz@monitoringtimes.com) from news clippings and links supplied by our readers. Many thanks to this month's fine reporters: Anonymous, Rachel Baughn, Richard Johnson, and Larry Van Horn.

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Whatever Happened to the Wireless?

The 2010-2011 Shortwave DX Season

By Eric Bryan

Do you remember the *wireless*? You know, British-English for *radio* (though radio has pretty well supplanted wireless even in British vocabulary nowadays). In the early days of radio, the enormous breakthrough of the wireless was that, unlike with the telegraph, you didn't need a wire connecting the transmitter to the receiver in order for the transmission to be heard. It was broadcast through the atmosphere to the receiver. And, even though a radio receiver itself was full of wires, because there was no wire needed between the transmitter and receiver, the clever Brits called the device a wireless.

When you think of train robbers sniping telegraph wires so warnings couldn't be tapped ahead, leaving a locomotive and its cars full of passengers and cargo sitting ducks and in the process cutting off whole towns from communications, the wireless was quite an advance.

And, when you couple the discovery of the reflective power of the ionosphere on short waves with the advent of portable, battery-operated shortwave receivers, it gave the term even greater emphasis. Now, people sitting on California beaches, or relaxing on porches on the Midwestern plains, or dining on the balconies of Manhattan apartments, could tune in London, Paris, Moscow, Cologne, Monaco, and signals from even more exotic, far-flung locales with their portable, battery-powered shortwave sets.

To us shortwave enthusiasts, this trend of shutting down shortwave broadcasts in favor of online streaming seems partly a devolution from wireless back to fully-wired, or cabled, transmissions. Though there are many advantages to being able to access international programming online, we can't help but wonder what will happen when there are infrastructure breakdowns, or, with the increasing amount of audio and video traffic streaming online, eventual bandwidth restrictions. After all, the atmosphere and ionosphere don't suffer from the same limitations, do they?

With this eventuality in mind, it would make sense that the international stations, which have ceased shortwave broadcasts to North America in favor of internet streaming, should at least keep their shortwave relay sites for North America maintained and ready to go as a back-up to their online systems. It

shouldn't be an all-your-eggs-in-one-basket approach.

The Coming Season

As we roll into the B10 (which stands for the broadcast schedule for the second half of the year) shortwave DX season, though there have been more cuts by some international broadcasters, all hope is not lost. In fact, in one respect, there has been an increase in international shortwave broadcasts.

There are some recent trends among shortwave stations which encourage interaction with listeners, such as some broadcasters' websites featuring online reception report pages. This not only eases postage costs for QSL collectors, but is even more streamlined than emailing your reception reports.

Quite a few stations, some of whom have canceled their shortwave transmissions, are carried on the World Radio Network (WRN), which is available by streaming, audio on-demand, podcast, satellite radio, Free-to-Air satellite, a number of domestic FM outlets, and via WRMI shortwave on 9955 kHz.

And finally, perhaps the most exciting shortwave development: Digital Radio Mondial (DRM). Digital broadcasting on shortwave seems to have had a shaky start, appearing to be on-again, off-again, over the last several years. Fueling this uncertainty was the commencement of DRM broadcasts by some shortwave outlets without mass-produced DRM receivers yet being available. DRM reception is now much easier, thanks to desk-top sets such as the Flex or WiNRADiO software defined radios or in a portable such as the UniWave DiWave 100.



Who was Listening?

But, as you'll see in the broadcast schedules which follow, DRM transmissions are in full swing in Europe, throughout the Pacific/Oceania, and parts of Asia. There are some to Africa and the Middle East, and a growing number to North America. All India Radio even

broadcasts four hours daily in DRM to Europe.

It's safe to say at this point that digital shortwave definitely has traction, and in some parts of the world, has arrived. Is it possible that DRM, with its near-FM quality audio, will give shortwave a second wind, creating an international broadcasting renaissance?

The List

What follows is a list of international broadcasters, showing their English language SW schedules beamed to North America, a notation if they use DRM transmissions, whether or not they offer online reception report facilities, and if they are part of the World Radio Network line-up. Whether a station no longer transmits to North America, broadcasts to other areas, or is regularly receivable in North America is also noted. I've also made some program suggestions where appropriate. Note that all times are UTC and frequencies in kHz.

Tune In

Judging by the number of transmissions listed in the following tables, there is still a lot of action on shortwave. If you have a DRM-capable receiver, so much the better – you have even more listening choices and opportunities. And, if the size of the DRM shortwave schedule list is anything to go by, digital broadcasting – and digital DXing possibilities – will increase over the coming years. It's time to fire up the wireless!



INTERNATIONAL ENGLISH LANGUAGE BROADCAST SCHEDULES

Albania: Radio Tirana

1530-1600	mtwhfa	13640
1945-2000	mtwhfa	11635
2100-2130	mtwhfa	9895
0130-0145	twhfas	6130
0245-0300	twhfas	6130
0330-0400	twhfas	6150
0430-0500	twhfas	6100

Argentina: Radio Exterior

0100-0200	twhfa	11710
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Online streaming of RAE faulty at time of writing.

Australia: Radio Australia

0000-0200	Daily	17715pa
0000-0800	Daily	15240pa
0030-0400	Daily	15415as
0100-0900	Daily	12080pa
0200-0500	Daily	15515pa
0430-0500	Daily	15415as
0500-0800	Daily	15160pa
0500-0900	Daily	13630pa
0530-0600	Daily	15415as
0600-0630	Sat/Sun	15290as 15415as
0630-0700	Daily	15415as
0700-0800	Daily	9955ca
0730-0930	Daily	11750pa
0800-1400	Daily	9580pa
1400-1700	Daily	7240pa
2100-2200	Daily	12080pa
2100-2300	Daily	13630pa
2200-2330	Daily	15240as
2200-2400	Daily	15560pa
2300-0100	Daily	12080pa
2300-0200	Daily	17795pa

DRM broadcasts to the Pacific and Asia.
Carried by the WRN.

Program suggestions:

"The Philosopher's Zone," Sunday, and Wednesday: examination of philosophical questions.
"All in the Mind," Sunday, Wednesday, Friday, and Saturday: exploration of the mental universe.
"Big Ideas," Monday, Thursday, and Friday: lectures, features, conversations and specials from Australia and around the world.
"Radio Australia Today," Sunday through Friday: magazine program with interviews, music, art, finance, etc.

Belarus: Radio Station Belarus

2100-2300	Daily	6155eu 7360eu 7390eu
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Program suggestions:

"Postcard from Belarus," Thursday; about historic monuments and travel in Belarus.
"Musicbox," Monday; modern Belarusian music.

Bulgaria: Radio Bulgaria

0000-0100	Daily	5900 7400
0300-0400	Daily	5900 7400

DRM broadcasts to Europe.

Online reception report page and download:
www.bnr.bg/sites/en/Pages/ReceptionReport.aspx

Program suggestion:

"Folk Studio," Sunday, Monday, and Tuesday; Bulgarian folklore, such as symbolic numbers, forests, and ancient bridges.

Canada: Radio Canada Int'l

0005-0105	Daily	9755
0105-0205	Daily	9755
1605-1805	Daily	9610

DRM broadcasts to North America.

Some programming carried by the WRN.

Program suggestion:

"The Maple Leaf Mailbag," Monday; magazine program with listeners' letters, short-wave news, etc.

China: China Radio Int'l

0000-0200	Daily	6020 9570
0300-0400	Daily	6190 9690 9790
0500-0600	Daily	5960
1100-1200	Daily	5960
1300-1500	Daily	15230
1400-1500	Daily	13675

DRM broadcasts to North America

Program suggestion:

"The Beijing Hour," Monday through Friday; news and current affairs.

Croatia: Voice of Croatia

2315-2330	Daily	7375sa
0300-0330	Daily	7375

Program suggestions:

"Croatia Today," daily; news focusing on Central and Eastern Europe, as well as the rest of Europe and sometimes other areas of the world. Multilingual broadcasts starting at 0000, are usually audible throughout most of the North American evening (and which include the English segments listed), are recommended for otherwise being filled with Croatian and Central and Eastern European pop.

Cuba: Radio Havana Cuba

0100-0700	Daily	6000
0500-0700	Daily	6010

Program suggestion:

"DXer's Unlimited," Sunday and Tuesday; propagation reports, radio and antenna projects, etc., from Arnie Coro CO2KK.

Czech Republic: Radio Prague

2330-2357	Daily	5930
0100-0127	Daily	7355
0200-0227	Daily	7355
0400-0427	Daily	7345

DRM broadcasts to Europe.

Online reception report page:

www.radio.cz/en/report

Program suggestions:

"Magic Carpet," one Sunday a month; Czech world music.
"Czech Books," two Sundays a month; interviews with Czech writers, and foreign writers living in the Czech Republic. "Letter from Prague," Sunday; correspondents' reports about life in and around Prague, as well as from places such as Kabul, and Prague, Nebraska.

Egypt: Radio Cairo

0200-0330	Daily	6270
2300-0030	Daily	7580

Program suggestion:

These broadcasts are recommended for the traditional Middle Eastern music they carry.

France: Radio France Int'l

0400-0430	Daily	7315af 9805af
0500-0530	mtwhf	9805af 11995af
0600-0630	mtwhf	9765af 13680af
15160af		
0700-0730	mtwhf	15605af
1200-1230	Daily	21620af



1600-1700 Daily 15605af

Program suggestions:

"Crossroads," Tuesday; people's struggles for survival in Africa and around the world.
"Culture in France," weekends; music, theatre, museums and more in France.
"Focus on France," daily; news and analysis devoted to France.

Germany: Deutsche Welle

0400-0500	Daily	5905af 5945af
15600af		
0400-0530	Daily	6180af
0500-0530	Daily	6130af 9755af
12045af 15600af		
0600-0630	Daily	5945af 7240af
12045af		
1900-1930	Daily	9735af 11690af
13780af		
2000-2100	Daily	9690af 9735af
13780af		
2100-2200	Daily	7280af 9545af
11690af 13780af		

DRM broadcasts to Asia and Europe.

PDF reception report form:

<http://www.dw-world.de/dw/article/0,3252720,00.html>

Program suggestions:

"Spectrum," Tuesday; science and technology.
"Living in Germany," Monday; news and human interest stories focused on Germany.



Greece: The Voice of Greece

0105-0205	Mon	7 4 7 5 9 4 2 0
12105sa		

Program suggestion:

The regular daily broadcasts, starting at 0000, though in Greek, are highly recommended for their mix of Greek traditional and pop music.

India: All India Radio

2045-2230	Daily	9445eu 11620eu
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DRM broadcasts to Europe.

Program suggestion:

AIR broadcasts in general recommended for the traditional Indian music which can often be heard in their programming.

Indonesia: Voice of Indonesia

1300-1400	Daily	9525as
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Iran: IRIB

0130-0230	Daily	6120 7250
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Israel: Kol Israel

0500-0530	mtwhf	9955ca
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Japan: Radio Japan

0000-0020	Daily	6145
0200-0500	Daily	5960
1200-1230	Daily	6120
1400-1430	Daily	11705
1500-1700	Daily	9535ca
2200-2220	Daily	13640pa

DRM broadcasts to Europe

Program suggestions:

"Japan & World Update," Monday through

Friday; news, commentaries, and sketches of Japanese life. "Listening Library Special," last Sunday of each month; readings of classic Japanese stories.

Korea, North: Voice of Korea

1300-1400	Daily	9335 11710
1500-1600	Daily	9335 11710

Korea, South: KBS World Radio

0200-0300	Daily	9580sa
1200-1300	Daily	9650

DRM broadcasts to Europe

Online reception report (page 1):

http://world.kbs.co.kr/english/radio/report/about_report.htm
Carried by the WRN.

Program suggestion:

"Seoul Calling," Monday through Friday; Korean news and culture.

Kuwait: Radio Kuwait

1800-2100	Daily	11990eu
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DRM broadcasts to the Middle East, Africa, and North America.

Libya: Voice of Africa

1400-1600	Daily	17725af 21695af
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Online streaming faulty at time of writing.

Moldova: Radio DMR

1800-1815	mtwhf	6240
1845-1900	mtwhf	6240
2315-2330	smtwh	6240

Program suggestions:

"Moldova and the World," Wednesday; news and events in Moldova, and from around the world relating to Moldova.

"World of Culture," Wednesday; arts and culture in Moldova.

Netherlands: Radio Netherlands

0400-0500	mtwhf	9955ca
1800-2000	Daily	12045af
1900-2000	Daily	12080af
2000-2100	Daily	21525af

Some programming carried by the WRN.

Program suggestions:

"The State We're In," Tuesday, Wednesday, Thursday, Saturday; first-person stories from around the world, such as interviews with British and Russian Cold War spies.

"Hear the World," Friday; world music. "Inside Track," Thursday/occasional series; interviews of RNW reporters about their experiences around the world.

"Radio Books," Tuesday and Friday; short stories by Dutch and Flemish writers.

("The Research Files" had vital, valuable health news, but has been canceled.)

New Zealand: Radio New Zealand Int'l

0459-0658	Daily	11725pa
0659-1058	Daily	9765pa
1300-1550	Daily	6170pa
1851-2050	Daily	11725pa
2051-2235	Daily	17675pa
2236-0458	Daily	15720pa

DRM broadcasts to the Pacific.

Online reception report page:

www.rnzi.com/pages/qs/_web.php

Carried by the WRN.

Program suggestions:

"Pacific Correspondent," Thursday and Friday; reports from regional correspondents.

"Mailbox," every other Monday and Tuesday; DX, utility, DRM, propagation, and other shortwave news, plus listeners' letters.

Nigeria: Voice of Nigeria

0500-0700	Daily	15120eu af
1000-1500	Daily	9690af
1700-2100	Daily	15120eu

Program suggestions:

"Musical Heritage,"

Saturday and Sunday; traditional Nigerian music.

"African Safari," Wednesday and Saturday; Nigerian travelogue.

"Nigerian Popular Music," Tuesday and Friday; Nigerian Afro-pop.

"Time for Highlife," Sunday, Monday, Wednesday, and Saturday; Nigerian and regional highlife music.



Oman: Radio Sultanate of Oman

0300-0400	Daily	15355af
1400-1500	Daily	15140eu

Poland: PRES

1300-1400	Daily	11675eu 11860eu
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DRM broadcasts to Europe.

Online reception report page:

www.polskieradio.pl/zagranica/eqsl/eqsl.aspx?r=tn

Carried by the WRN.

Program suggestions:

"Around Poland," Wednesday; audio sight-seeing around the country.

"Multi-touch," Thursday; covering topics such as the ancient pottery tradition of Poland, Polish vineyards, and the Warsaw nightingale, this program also acknowledges reception reports on air.

"EuroPol Express," Friday; monks, clay baths, coffee massages, couch-surfing – you name it.

"Galician Almanac," Saturday; focusing on an historical region in southern Poland and Ukraine, exploring, for example, the small, relatively remote villages in this mostly rural area.

Romania: Radio Romania Int'l

0100-0200	Daily	6145 9800
0400-0500	Daily	6130 7310
2130-2200	Daily	6115 9755

DRM broadcasts to Europe.

Online reception report page:

www.rrr.ro/art.shtml?lang=1&sec=334&art=15152

Carried by the WRN.

Program suggestions:

"Traveller's Guide," Thursday; audio tourism program of Romania which also hosts contests for listeners.

"RRI Encyclopaedia," Saturday; history, writers, museums, films, beer, the classic Dacia car, spectacles, forests, opera, duels, cooking – it's all here.

Russia: Voice of Russia

0000-0300	Daily	6240 7250
0300-0400	Daily	7250ca
0300-0500	Daily	6240ca 12040 13735
0300-0700	Daily	12030
0500-0700	Daily	9840 9855
0800-0830	mtwhf	9955ca



2300-2400	Daily	7250 7260ca
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DRM broadcasts to Asia and Europe.

Carried by the WRN.

Program suggestions:

"News and Views," daily; VOR views on major news stories.

"Outlook," Tuesday through Saturday; current events roundup.

"Kaleidoscope," Monday, Tuesday, Thursday, Friday, Saturday, Sunday; news and culture program about the Commonwealth of Independent States (made up of former Soviet Republics).

"Moscow Mailbag," Monday, Tuesday, Thursday, Friday, Sunday; question-and-answer, listeners' letters program.

"Music Around Us," Monday, Tuesday, Thursday, Friday, Sunday; a blending of songs, folklore, and classical music. (VOR also carries much more classical music on various programs.)

"Folk Box," Tuesday, Wednesday, Thursday, Saturday; Russian folk music.

"Jazz Show," Wednesday, Friday; the world of jazz.

Saudi Arabia: BSKSA

0930-1230	Daily	15250af
1000-1300	Daily	15470af

Program suggestion:

BSKSA broadcasts in general recommended for the traditional Middle Eastern music they often carry.

Serbia: Int'l Radio Serbia

0130-0200	mtwhfa	6190
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Slovakia: Radio Slovakia Int'l

0100-0130	Daily	6040 9440ca sa
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Carried by the WRN.

Program suggestion:

"Slovakia Today," daily; news and magazine program, with history, arts, and culture segments. Friday's broadcast includes a recap of the week's headlines.

South Africa: Channel Africa

0300-0400	Daily	3345af 6120af
0400-0700	Daily	7230af
0600-0655	Daily	15255af
0700-1200	Daily	9625af
1400-1600	Daily	9625af
1700-1755	Daily	15235af

Program suggestion:

"Africa Rise & Shine," news, current affairs, economy, sports, etc.



Spain: Radio Exterior de España

0000-0100	Daily	6055
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DRM broadcasts to Europe.

Program suggestion:

"Airwaves," weekly with weekend repeats; culture and human interest program, with topics ranging from the burkha controversy to Spanish Harley-Davidson gatherings, plus listeners' letters.

Sweden: Radio Sweden

Carried by the WRN.

Program suggestions:

"Inside Sweden," Friday; society, culture, and politics program about Sweden, which aims to "be your guide to Sweden today."
 "Radio Sweden Weekend," Saturday and Sunday; weekend roundup of the Monday through Thursday "Radio Sweden Weekday" program, covering news, current affairs, technology, and culture, for expats, new immigrants, and Swedophiles.

Syria: Radio Damascus

2100-2200 Daily 9330eu 12085eu

Program suggestion:

Broadcasts recommended for the traditional Middle Eastern music they sometimes carry.



Taiwan: Radio Taiwan Int'l

0200-0300 Daily 5950 9680
 0300-0400 Daily 5950
 0500-0600 Daily 5950

Online reception report form:

<http://english/rti.org.tw/customerservice/ReceptionForm.aspx>

Program suggestions:

"Instant Noodles," Thursday; wacky and silly news from the Asia-Pacific region.
 "Jade Bells & Bamboo Pipes," Wednesday; traditional Chinese and Taiwanese music.
 "Time Traveler," Wednesday; important events in Taiwan's history.
 "The Occidental Tourist," Saturday; an outsider's view on Taiwan, its history, current events, and direction for the future.

Thailand: Radio Thailand

0000-0030 Daily 9680
 0030-0100 Daily 12095
 0200-0230 Daily 15275

Turkey: Voice of Turkey

0400-0500 Daily 6020 6040
 2300-2400 Daily 5960

Program suggestions:

"Blue Voyage," Sunday; Turkish history and archaeology.
 "Hues and Colours of Anatolia," background and stories of this historic region.
 "Turkish Album," Friday; magazine program covering sports, the arts, and current events.
 "Istanbul Istanbul," Friday; travelogue of Istanbul, giving, for example, descriptions from 19th century British travel writers.



VOT broadcasts in general recommended for the haunting traditional Turkish music often carried by their programming.

Ukraine: Radio Ukraine Int'l

0100-0200 Daily 7440

Program suggestions:

"Insight," Monday; the day to day as well as spiritual life in Ukraine.
 "Roots," Friday; educational, culture program.
 "Reading Lounge," Monday; readings from the works of famous Ukrainian writers.

United Kingdom: BBC World Service

0200-0300 Daily 6005af
 0300-0400 Daily 6005af 6105af
 6145af 9410as 12095as
 0300-0600 Daily 7255af
 0300-2200 Daily 6190af
 0330-0600 Daily 11945af
 0400-0500 Daily 7445af 12035af
 0400-0600 Daily 9410af 15360as
 0400-0700 Daily 6005af
 0500-0530 Sun 15420af
 0500-0600 mtwhf 15420af
 0500-0700 Daily 11765af 17640af
 0600-0700 Daily 9410af 12015af
 0600-0800 Sat/Sun 15420af
 0600-1600 Daily 9860af
 0700-0800 Daily 11765af 13820af
 17830af
 0700-1000 Daily 15400af
 0800-1000 Daily 17830af
 0800-1300 Daily 17640af
 1000-1100 Sat/Sun 15400af 17830af
 1100-1130 Daily 15400af
 1100-1800 Daily 17830af
 1200-1300 mtwhf 9410ca 11860ca
 1300-1400 Daily 15420af 17640af
 1400-1700 Daily 15420af
 1400-1830 Daily 5975as
 1500-1530 Daily 11860af 15105af
 1500-1700 Daily 12095me
 1500-2100 Daily 15400af
 1530-1615 Sat 9410af 11860af
 15105af
 1600-1700 Daily 9740af
 1600-1800 Daily 13820af
 1615-1630 Sat/Sun 9410af 11860af
 15105af
 1630-1700 Daily 9410af
 1700-1746 Daily 9410af 11860af
 1700-1900 Daily 15420af
 1700-2100 Daily 12095af
 1800-1900 Daily 13820af
 1800-2100 Daily 11810af
 1830-2100 Daily 9410af
 1900-2000 Daily 9835af
 2000-2100 Daily 9615af
 2100-2300 Daily 9915af 12095af
 DRM broadcasts to Europe

Program suggestions:

"From Our Own Correspondent," Saturday and Sunday; BBC reporters from around the world tell the stories behind the headlines.
 "Digital Planet," Tuesday; cutting edge and practical technology information.

"World Book Club," Saturday; interviews with world-famous authors, including questions from listeners.

"Global Arts and Entertainment," Saturday; weekly compilation of the Monday through Friday arts, culture, and entertainment program, "The Strand."

"Arts and Ideas," podcast, updated weekly; the best of BBC Radio 3's Monday through Thursday arts and ideas program, with philosophical debates and questions (such as the value of optimism).

"Newshour," twice daily; worldwide news and analysis.

"World Update," Monday through Friday; latest world news.

"The World Today," Monday through Friday; world and regional news roundup.

USA: VOA

0130-0200	twhfa	7405ca sa
0300-0430	Daily	9885af
0300-0600	Daily	4930af 6080af
0300-0700	Daily	6080af 15580af
0400-0500	Daily	4960af
0600-0700	Daily	9885af
1400-1500	Daily	15580af 17650af
17715af		
1400-1530	Daily	6080af
1400-1700	Daily	4930af
1500-1600	Daily	15580af 17715af
17895af		
1530-1700	Daily	6080af
1600-1700	Daily	9395af 13600af
15445af 15580af 17895af		
1700-1730	Daily	17895af
1700-1800	Daily	15580af
1700-1830	Daily	13710af
1730-1800	Daily	17895af
1800-1830	Daily	11975af
1800-1930	Daily	15580af
1800-2000	Daily	17895af



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 Miami to the Bahamas

- Full details on the NASB webpage, www.shortwave.org. Click on "Annual Meeting"
- Take the NASB's International Shortwave Survey and get a free subscription to the NASB Newsletter. Find the link on the NASB webpage, www.shortwave.org
- Listen to "The Voice of the NASB" on the third Saturday of each month on HCJB's DX Party Line: 12 midnight Eastern Time on 9955 kHz

1830-1900	Daily	11975af 13710af
1900-2000	Daily	13710af
1900-2100	Daily	11975af
1930-2000	Daily	15580af
2000-2100	Daily	13710af 15580af
2100-2200	Daily	15580af

Program suggestions:

"African Beat," Monday through Friday; modern African music, plus music retrospectives.
 "African Music Mix," daily; pan-African music.
 "Africa News Tonight," Monday through Friday; news magazine of reports from correspondents, interviews, science and technology, business, arts and culture, and humanitarian issues.
 "Daybreak Africa," Monday through Friday; headline news, interviews, correspondents' reports, and sports, all on Africa.
 "Music Time in Africa," Saturday and Sunday; African music program, both traditional and Afro-pop.
 "Nightline Africa," Saturday and Sunday; magazine with news, reports from correspondents, interviews, and culture and music.

Vatican City: Vatican Radio

0250-0320 Daily 6040 7305
 DRM broadcasts to Europe and North America.
 Carried by the WRN.

Venezuela: Radio Nacional de Venezuela

1500-1600 Daily 11680 (Spanish, some English)
 2300-2400 Daily 13680sa 15250 (Spanish, some English)



Vietnam: Voice of Vietnam

0100-0130 Daily 6175
 0230-0300 Daily 6175
 0330-0400 Daily 6175



**DIGITAL RADIO MONDIAL
 International Shortwave Broadcasts**

Radio Australia:

1100-1200 Daily 12080pa English
 1200-1400 Daily 5995pa English

TDP Radio, Belgium:

0700-0800 Mon 6015eu English
 0800-0900 Tue 6015eu English
 0900-1000 Wed 6015eu English
 1000-1100 Th 6015eu English
 1100-1200 Fri 6015eu English
 1200-1300 Sat 6015eu English
 1900-2000 Daily 17755na English
 2300-2400 Daily 9790na English

BNR 1 Horizont, Bulgaria:

0500-0800 Fri 9400eu Bulgarian

0700-1000	Sat/Sun	11900eu
Bulgarian		
1000-1300	mtwh	11900eu
Bulgarian		

Radio Bulgaria:

1630-1700	Daily	9400eu	Russian
1730-1800	Daily	9700eu	German
1800-1830	Daily	9700eu	French
1830-1900	Daily	9700eu	English
1900-2000	Daily	9700eu	Bulgarian
1000-1030	Sat/Sun	11900eu	
English			

Radio Canada Int'l:

1505-1605	Daily	9800na	English
1605-1805	Daily	9800na	English
1805-2005	Daily	9800na	French
2200-2300	Daily	9800na	English

China Radio Int'l:

0100-0200	Daily	6080na	English
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Radio Prague:

1400-1430	Sat	9660eu	English
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Agora Digital Grasse, France:

0000-2400	Daily	25775eu	French
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TDF Radio, France:

0000-2400	Daily	25775eu	French
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Deutsche Welle:

0200-0300	Daily	15205as	English
0700-0800	Daily	3995eu 6130eu	English
0800-0900	Daily	9610eu 12005as	
13810eu	English		
1100-1400	Daily	9545eu 13810eu	
English			
1800-1900	Daily	3995eu	English
1900-2100	Daily	3995eu	English

B Fuenf Aktuell, Germany:

0500-2305	Daily	6085eu	German
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All India Radio:

1745-1945	Daily	9950eu	English
1945-2045	Daily	9950eu	Hindi

Vividh Bharati, India:

0900-1200	Daily	6100as 9870as	Hindi
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Radio Japan:

1100-1130	Fri	9760eu	English
1130-1200	Fri	9760eu	Russian

KBS World Radio:

1100-1130	Sat	9760eu	English
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Radio Kuwait:

0500-0800	Daily	6055me	Arabic
1315-2110	Daily	9880af	Arabic
2200-0300	Daily	11675na	Arabic

RTL Luxembourg:

0000-2400	Daily	25795eu	English
1400-1700	Daily	6095eu	German



Radio New Zealand:

0459-0658	Daily	13730pa	English
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0659-1058	Daily	9870pa	English
1059-1158	Daily	9870pa	English
1130-1200	Sat	9760eu	English
1551-1750	Daily	6170pa	English
1708-1735	Mon	6170pa	French
1751-1850	Daily	9890pa	English
1840-1850	mtwhf	9890pa	Samoan
1851-1935	Daily	9890pa	English
1853-1858	mtwhf	9890pa	Niuean
1936-2050	Daily	11675pa	English
1940-1955	smtwh	11675pa	Tongan
1955-2000	Fri	11675pa	Hindi
2051-2150	Daily	11675pa	English
2115-2135	Sun	11675pa	French
2115-2135	Mon	11675pa	Pidgin
2140-2150	Mon	11675pa	French
2151-2200	Mon	15720pa	French
2151-2235	Daily	15720pa	English
2236-0458	Daily	17675pa	English

PRES, Poland:

1800-1900	Daily	6130eu	English
2030-2100	Daily	3975eu	German

Radio Portugal:

0930-1100	Sat/Sun		9815eu
Portuguese			

Radio Romania:

0530-0600	Daily	6175eu	Russian
0600-0630	Daily	6100eu	French
0630-0700	Daily	6020eu	English
0700-0730	Daily	6025eu	German
1600-1700	Daily	6030eu	Russian
1700-1730	Daily	5875eu	German
1800-1830	Daily	5895eu	English
1800-1900	Daily	6065eu	English
1900-1930	Daily	6180eu	Italian
1900-2000	Daily	5930eu	German
2100-2130	Daily	6030eu	French

Voice of Russia:

0200-0400	Daily	15735as	Russian
0400-0600	Daily	15735as	English
0700-0900	Daily	11635eu	English
0900-1100	Daily	7325eu	Russian
1100-1300	Daily	7325eu	German
1200-1300	Daily	7340as	English
1300-1400	Daily	7340as	Hindi
1300-1400	Daily	7325eu	Russian
1400-1500	Daily	7340as	English
1400-1500	Daily	5905eu 9675eu	English
1500-1600	Daily	5905eu 9675eu	English
1500-1600	Daily	7340as	Hindi
1600-1700	Daily	9675eu	German
1700-1800	Daily	6145eu	French
1800-1900	Daily	6145eu	Italian
2000-2200	Daily	6105eu	French

REE Spain:

0500-0900	Daily	9780eu	Spanish
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BBC:

0500-0700	Daily	3995eu	English
0900-1000	Daily	9610eu	English
0900-1100	Daily	13810eu	English
1000-1100	Daily	9545eu	English
1400-1500	Daily	9545eu	English
1400-1600	Daily	13590eu	English
1500-1700	Daily	5790eu	English
1600-1800	Daily	3995eu	English
2100-2300	Daily	3995eu	English

Disco Palace, USA:

1400-1500	Daily	6015eu	English
2000-2100	Daily	17755na	English

Vatican Radio:

1500-1515	Daily	6060eu	German
1515-1530	Daily	6060eu	Polish
2045-2130	Daily	9800na	English
2300-2330	Daily	7370na	English

Ten-Tec 1253: A Great First Radio Project!

By Robert Gulley AK3Q
(photos courtesy the author except where noted)



Photo 1. Ten-Tec 1253 Regenerative Radio Kit

Have you ever read about folks whose interest in radio started when they built their first receiver, usually under the watchful eyes of their father? I must confess to a bit of envy whenever I read stories like that, because I always wanted to build a radio as a kid, but never got the opportunity.

The '50s and '60s were in some ways the golden era of amateur radio, because of the many build-it-yourself kits available on the market. Unfortunately, the advent of miniaturized circuits and the like served to discourage kit building projects for a number of years. After all, most folks want the latest technology!

Whether through nostalgia, a desire for simpler times, or merely a desire to be more hands-on with all things radio, kits are making a very welcome comeback. One such kit, the Ten-Tec 1253 nine-band regenerative shortwave receiver, helped this amateur radio operator fulfill a 35-year-old dream of building a working shortwave radio, and it was a blast!

For those of us who never had the experience of building a radio, the 1253 kit strikes a great balance between being challenging and yet "do-able." While I messed around with radios a bit as a kid, building a modern radio was intimidating to me. Being used to large components and bulky soldering irons, modern kits looked a little scary.

However, once I made it past the soldering hurdle, I gained the necessary confidence to move ahead, and the whole experience was a rewarding one. Now, far from being intimidated by a kit building project, I am already looking forward to my next one!

Ten-Tec 1253: Old Meets New

The 1253 is what is known as a regenerative receiver, a technology that has been around since the early days of radio. The concept is pretty simple, as well as inspired: received signals are regenerated (fed back) into the receiver until their strength is powerful enough to be sent to the audio portion of the radio and out to the listener. This process allows for a relatively simple, yet quite ingenious circuit layout. Where vacuum tubes were once used, small, more efficient transistors have replaced them, allowing more radio in a much smaller size (see photo 1).

The 1253 kit comes with all parts well organized and divided by components and/or

by section, and for the most part they should be left this way. A few components were unfamiliar to me, so I had to identify them by process of elimination (there, I have admitted to the world I am not an electronics genius . . . confession really *is* good for the soul!)

When identifying the various resistors (and there are a lot of them!) orient them all in the same way on a strip of wide masking tape so they can be easily retrieved later (see photo 2). Because the resistors are small and the colored bands are sometimes hard to read (especially if the ol' eyes are wearing down like mine), use a magnifying glass or a photo/jewelers loupe to identify them properly.



Photo 2. Resistors arranged on wide masking tape for easy access

Tools and Set-up Tips

In addition to the loupe mentioned above, soldering will require a low-wattage (15-25W), fine point soldering iron and some thin (.032") 60/40 resin-core solder. While this kit does not use surface-mount components, the soldering requires a very fine point to avoid connecting two unrelated traces. I also purchased an inexpensive soldering station to hold the heated iron securely, as a safety precaution when not in use and as a place to occasionally wipe the tip.

If you have never tackled a project like this before, I would encourage you to go to your local Radio Shack or similar store and buy a few resistors and a small piece of "breadboard" (jargon for plastic circuit boards to which components are soldered) and firm up your soldering technique. I purchased \$2 worth of parts to practice soldering a few resistors, and this helped me to overcome the fear of messing something up in the kit. But, even if something gets messed up, replacement parts are available from Ten-Tec or are likely available from the local Radio Shack store. I have included a picture of what a soldering joint should look like (see photo 3). Don't worry if every joint is not a perfect teardrop – mine certainly aren't, but this is the general shape to shoot for.

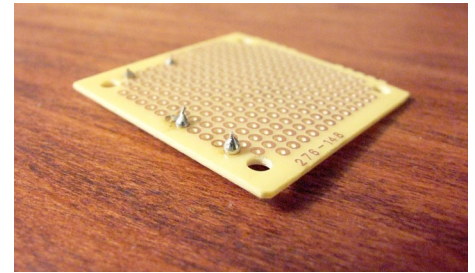


Photo 3. Here is an example of how a soldering joint should look

Remember to first heat the joint with the soldering iron and then lay the soldering wire on top of the iron so that the solder runs down onto the joint. Be careful not to overheat the component or the circuit board; pull the iron away if the joint may be overheating. Let it cool and then try again. While the heat of the soldering iron may produce a slight discoloration on the surface of the circuit board, discoloration should be very slight. If the surface turns dark brown or black, the board is getting much too hot.

Other useful tools include: wire snips, small gauge wire strippers, the afore-mentioned wide masking tape, needle-nose or angled needle-nose pliers, several small alligator clips, and a wick de-soldering tool. The assembly manual will also list a few specific tools such as screw drivers and an Allen wrench for case assembly.

A large, clean, well-lit work surface will help immensely both for spreading out parts and for having the "elbow room" needed to solder. Also, a bright light really helps when using the loupe to examine solder connections; sometimes "tails" left from soldering are hard to see otherwise.

Manual and Printed Circuit Board

Having never built anything like this before, I was determined to go slowly, both as a means of understanding and enjoying the process and as a means of making sure I didn't make too many mistakes! I had waited 35 years to build my first radio, so a few more weeks wouldn't kill me. After all, there's no prize for getting the project done all in one night!

The manual is divided up into seven phases, each phase more or less building on the last. At several points you are encouraged to perform some basic tests to make sure everything is go-

ing along as it should. While I did not do every test, I did do the test which indicated whether or not the receiver worked on one specific band and the test to determine that power was being applied properly.

I have included photos of each major stage when completed, both as an indicator of how each phase comes together and as a photographic reference for what each phase actually looks like when complete, something I wish the manual had included (see “phase photos”).

The circuit board is very detailed with component markings and orientation markers as needed (see photo 4). It definitely pays to double check your work as you install various components, and following the markings on the board makes everything much easier. Care taken along each step will reap rewards later, and you will have the satisfaction of hearing your radio come to life when everything is finally in the proper place.

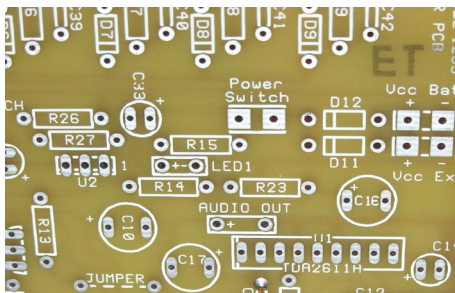


Photo 4. Circuit board with detailed markings for components and circuit layout

Phase One: Getting Your Feet Wet

Phase one helped me in two ways. First, it allowed me to “get my feet wet” by working on a small, yet interrelated section. As I followed the trace lines and thought through the process, I began to see the relationship between the components, which was very educational. The second way it helped was by providing an early test of the unit so I could check my work right away. Once I knew phase one was completed properly, I had the confidence to move forward.

If you’re going to build this kit, my advice is to stop after phase one and give yourself a break, both to enjoy your accomplishment and to study the circuitry in order to understand what is going on with the radio. Radio theory is great, but there is no substitute for seeing the components connecting together to form a circuit path.

Assembly Tips

During the assembly process you will need to shape some of the components to fit properly into the circuit board. When shaping the resistors or the inductors, I recommend using your thumbnail as a bending fulcrum (see photo 5). Use smooth, slow movements and, if adjustments are needed, just straighten the wires and begin again.

In preparation for soldering components, I often found spreading the leads apart helped keep the piece secure while soldering. Press the



Photo 5. Using thumbnail as a fulcrum for shaping leads on resistors and inductors

component down gently until it sits solidly on the board, and then spread the leads apart underneath. Two or three pieces may be soldered as a group this way. In particularly tight places, I found doing a “test run” with the positioning of the iron and the solder helped ensure quick, accurate soldering.

Once a component is soldered properly, the leads may be trimmed back as close to the solder joint as possible. Just make sure to allow sufficient time for the joint to harden. I typically soldered two or three pieces together and then trimmed the leads.

Phases 2-4: A Radio Is Born

In the next two phases, a significant portion of the radio is assembled. Phase 2 deals with DC voltage control, while Phase 3 builds the RF amplifier section, the regenerative detector, and the varactor tuning section. What this means is that when Phase 3 is complete, the radio is ready to be tested on a single band (Phase 4).

At this point I had things held together with clips and tape (see photo 6), but by golly, it worked! My first listening experience brought in several stations from Cuba, and I couldn’t have been more excited! Even my wife got a thrill out of it.



Photo 6. Phase 4 testing stage with tape and clips to hold it together, but it works!

Finishing Up Assembly

Phases 5-7 deal with assembling the band switching daughterboard/main board connections, LEDs, final wiring, and the cabinet assembly (see Phase photos). Again, take your time! There are a lot of steps involved in cutting wires to the right length, placing and adjusting LEDs, and arranging components together properly so that everything fits as it should. This is a lot of radio in a fairly small space!

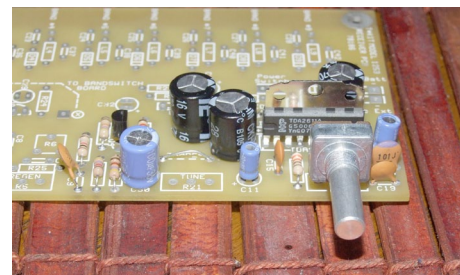


Photo 7. Phase 1 completed

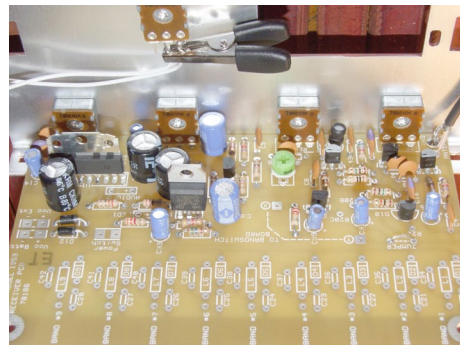


Photo 8. Phase 3 completed

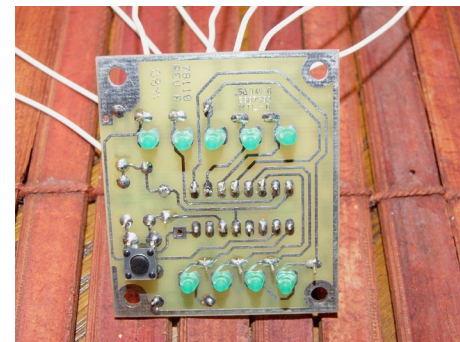


Photo 9. LEDs completed (daughterboard)

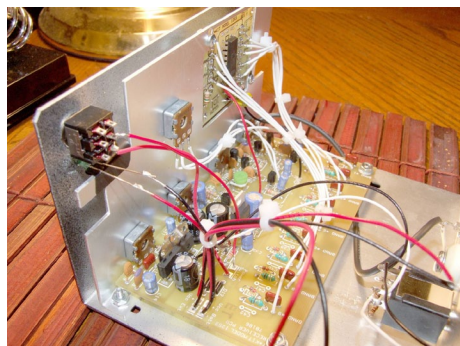


Photo 10. Phase 5 completed



Photo 11. Rear view of finished kit. (Courtesy: Ten-Tec)

Follow the directions carefully, and make sure to take into account any addendums or clarifications provided that may be in addition to the basic manual. In my case, there was a two-page Technical Reference Bulletin which had several updated part numbers and several assembly notes which were vital to completing the radio.

Once the unit was assembled and the batteries were installed, I had a great little portable radio which received quite well. The unit may also be powered by an external 12v power supply, but I prefer the radio as a portable most of the time. Fortunately, the batteries may be left in while using a power supply, because the unit is wired to bypass the batteries when hooked to external power.

Operation

I have to admit that, in all my radio experience, I had never used a regenerative radio be-

fore, and so I was not prepared for the increased sensitivity to tuning this type of radio requires. At first I thought I must have done something wrong, even though my test in phase 4 was a success. As it turned out, a bit more reading in the operations side of the manual gave me the answer (imagine that!), and I started tuning with a much more delicate hand. I soon started hearing all kinds of stations coming in, including single sideband (SSB) amateur radio signals.

Having been used to using some sort of beat frequency oscillator (BFO) or similar tuning procedure with my other rigs, I was pleasantly surprised to discover all SSB reception requires on a regenerative radio is just an adjustment of the fine tuning control. What does take some getting used to is the sensitivity of the "REGEN" control.

While standard for this type of radio, it still came as something of a surprise to me. The slightest movement can change reception drastically, but this just adds to the fun and to the challenge. I love the feeling of working with a radio with such a history as the regenerative radio. This project has truly given me a deeper appreciation for those who came before us.

I hope you give this kit a try as your first radio project or as just a great addition to your shortwave radio collection. The completed radio not only looks professional in its design, but it also performs quite well. And the best part of all? You will be quite proud to say "I built this myself!"

The Ten-Tec 1253 kit is available for \$89 from: Ten-Tec

1185 Dolly Parton Parkway
Sevierville, TN 37862 U.S.A.
Phone: (865) 453-7172
<http://www.tentec.com/index.php?id=51>

Ten-Tec provides on-line technical tips via its "Knowledge Base" page on its web site. Answers to customer questions on a wide range of topics covering all Ten-Tec products new and old may be found there. In addition, their service line (865-428-0364) is available from 8:00 am to 5:00 pm ET Monday through Friday. You may also e-mail your service-related questions to service@tentec.com.

About the Author:

Robert Gulley's interest in amateur radio and shortwave listening began as a young boy, but he did not get his Technician license until 2007. He then quickly upgraded to General Class (Dec. 07) and then Extra Class (May of '08.). He has never lost his fascination for all things radio, and regularly listens to shortwave, AM DX, and police scanners, as well as chasing DX on the amateur bands. He is also developing a passion for "boat anchors" and plans to restore several Swan 350s as time allows.

Robert writes a monthly column for antennex magazine focusing on antenna topics for beginners. He has also written several articles for QST magazine. When not using one of his many radios, Robert is a writer, adjunct college professor and a retired minister. He also teaches classes in woodturning and dabbles in photography, digital imaging and computers. You may contact him at AK3Q@ak3q.com

MT

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An Easy to Build All-Band Loop Antenna

By Bob Patterson K5DZE (graphics courtesy the author)

As an active amateur operator for over 50 years and a retired Army Signal Corps officer, I have built and used a lot of different antennas for work and play. But, of all the antennas I have used, I would select the 80-6 meter full-wave horizontal loop antenna as one of the very best all around antennas for amateur radio work.

The version of this antenna that I currently use offers the advantages of being easy to construct and highly effective on all bands from 80 through 6 meters. It's also a great antenna for short wave listening (SWL) on the frequencies between the amateur bands. Since I also enjoy listening for aviation non-directional beacons (NDBs), I also like the fact that it works reasonably well as a receiving antenna for long wave frequencies, below 500 kHz.

Considering the fact that this antenna is not overly expensive, it becomes an antenna well worth serious consideration, giving you one wire antenna to meet all of your HF needs.

The Basic Loop Formula

The basic formula for determining the length of a full wave loop is $\text{Length} = 1005 / \text{Frequency in MHz}$. This formula figures the antenna length for the lowest frequency at which the antenna will operate effectively. While the loop will operate quite well on any frequency above the design frequency, it will exhibit a fairly sharp cut-off below the design frequency. As an example, antennas designed for the high end of 80 meters, say around 3.900 MHz, will likely not be tunable on the Morse code (CW) portion of 80 meters (the low end of the band) with your rig's internal tuner.

Since I like to operate low power (QRP) CW and digital modes such as PSK31 on 80, I

configured my antenna for the low end of the band. Using $L = 1005 / 3.540 \text{ MHz}$, I derived a length of 283.9 feet or about 284 feet in length. If you only work the single-sideband (SSB) portion of the band and don't need the low end of 80, you could figure the length using 3.8 MHz. In this case, the antenna would be about 264.5 feet, thus saving about 20 feet in overall length.

The one perceived problem that most amateurs think about when you mention a full wave loop is the overall size of this antenna. Compare a horizontal 80-6 meter loop antenna at 284 feet to a horizontal G5RV at 102 feet, and the loop looks almost three times the length of the G5RV, but those numbers are deceiving. If you give the installation some thought, you will find that the loop can be quite reasonable to install. Let's take a look at what I mean.

Since loop antennas are normally put up in a 4 sided square or 5 sided pentagon shape, the length of any one side is between 71 and 57 feet in length. These shorter sides may make your installation easier than trying to put up a 102 foot long G5RV. To get an idea of how it will fit on your lot, lay the antenna out on the ground in a configuration that will yield the greatest amount of area enclosed within the loop.

A square is most commonly used and is the easiest to make, since it requires only four supports. It also provides the best compromise in shape and support for the loop antenna. Other shapes might include an octagon or a triangle, but in any event it is important to keep in mind that the idea is to enclose as much space inside the loop as possible.

Components

This version of an 80-6 meter loop uses 52 Ω coax rather than open wire for the feed line, and this simplifies a number of issues. You will need antenna wire, a 4:1 balun coil (commercial or homemade), corner insulators, and some braided cord for the insulator supports. My days of climbing trees to put up antennas are long gone, so I set about to install this antenna from the ground. It worked so well that I hardly worked up a sweat for the whole project!

For the installation process, you will need a slingshot, a bow and arrow, or a really strong arm to get the line up into the trees you select for support. Add to this a fishing



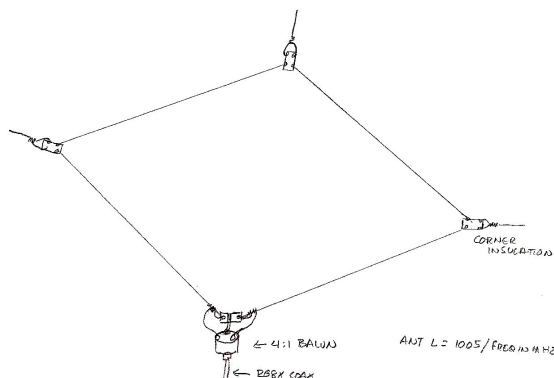
reel or a spool of strong monofilament line and a heavy lead fishing weight. I chose a simple slingshot to launch a small spool of fishing line lying on the ground with a lot of line pulled off and it worked out nicely.

For the antenna wire, I highly recommend aluminum electric fence wire (a 1/4 mile spool of 17 gauge wire costs \$20 at your local Tractor Supply Company.) It is very strong, has a small diameter, and is much less expensive than copper antenna wire. Avoid the temptation to use steel electric fence wire, as it is heavier and a bit harder to work with, while the aluminum wire is very easy to use.

Since the two ends of the loop attach to two screw terminals on a balun coil, no soldering is needed. Be careful not to create kinks, when you're unspooling the wire, as they will become the weak points in the antenna.

For the support lines, I used an olive drab Dacron cord purchased on eBay (1/8" x 500' for ~\$35). Universal Radio has a 100' roll of 1/8" dark, Polyester braided rope for \$12. This kind of rope is very strong, easy to work with, and very stealthy when installed. You can substitute any similar rope you have on hand, but avoid cotton or other natural fibers, as they will deteriorate quickly in year 'round weather and become the target of squirrels or other critters for nesting material. Use braided line rather than twisted line, as the braided cord doesn't unravel as easily. Polyester or similar rope may be cut cleanly with a hot knife to seal the ends from coming unraveled.

For a feed line, the smaller diameter RG-8X coax cable with a Buxcomm or similar 4:1 balun at the feed point works nicely. Depending upon what you read, the impedance at the feed point is around 100 to 125 ohms, so a 4:1 balun



Line drawing of the complete all-band HF loop.



Fig 1: A corner insulator, shown hanging down loose for clarity.

is a simple way to provide a better match for 52 ohm coax. I tried a direct coax to antenna feed using no balun and quickly found tuning problems at some frequencies, so I used a 4:1 balun that I had on hand to resolve the problem. This makes loading all bands very easy on the transceiver's built-in tuner at or above the design frequency. The bottom line is, use a balun.

I also recommend using some non-oxidation aluminum paste, such as GB brand OX-GARD # OX-100, from ACE Hardware, on the two ends of the aluminum loop wire where these tie on to the balun screw terminals. This makes for a good electrical contact, and it is available from most hardware stores in a small tube. Every year you can let down the balun via the support cords to clean and check the screw terminal contacts.

To get best results at your site, you'll need four support points to make your loop into a square or something approaching a square. Five supports will make a pentagon shape and give a little more area inside the antenna loop which is even better. Support structures can be trees, poles, masts or whatever you decide to use.

I found that the best way to see how the antenna would look when installed was to measure out the 284-ft wire and then lay it out on the ground in the shape that I planned to use. This way you can see if the shape is optimum for your site and if your support lines and insulators are going to be in the right place to hold the shape.

When placing each corner insulator on the antenna, don't tie the insulator to the antenna; leave it free to slide back and forth on the wire to find the best spot after the support is pulled up (see figure 1). To do this, while the antenna is on the ground, simply slide the number of insulators that you will use on to the antenna wire and then position them to about the correct place on the antenna.

Construction

Begin making the antenna by putting up the support lines that will hold the antenna. To see

where to put your support lines/insulators, look at your loop lying on the ground in front of the trees, poles, or masts that you will use. If you use trees for supports like I do, then simply tie a lead weight to the fishing line and, using the slingshot, launch it over the tree limb you want to use.

Pull the fishing line down and tie the Dacron/Nylon support line to the fishing line and pull it up and back over the tree limb. Tie the support line to the proper insulator on the antenna. Cut the other end of support line from the spool and tie it firmly to the tree trunk so it won't come loose, and slip it back up into the tree. Do this for each support and insulator.

To assemble the antenna's feed point, open the loop at one corner (or any convenient place on the wire) and connect an insulator at this feed point between the wires. This will be used to take the strain off the antenna where the balun coil and coax are attached. Leave enough wire (about 4") on the ends of this insulator to let you easily tie the antenna to the contacts on the balun coil. Then, using the "eye bolt" on top of the balun coil, tie the balun to the center of the insulator. (Fig.2) Tape all connections for weather protection with Coax-Seal or similar product.

For best range and DX coverage, raise the antenna corners to at least 30-40 ft. elevation, keeping the antenna horizontal. Leave a little slack in the support lines to allow for tree-sway in strong winds.

Real-world Results

When I first tried this antenna, I cut my wire to the calculated length, fed it directly with RG-8X coax (no balun), and put it up only 20 feet' high on the corners. The centers were only about 17 feet, due to sagging.

This version of the loop was cut for use on Army MARS frequencies and was about 253 feet long or about 63 feet on a side. It replaced an effective commercial G5RV that had been at 30 feet high. The results were striking and exceeded my expectations. During comment time on our state net the first time I used it, several stations that were at least 250 miles distant immediately commented, without my asking, that my signal was considerably stronger than usual and wanted to know if I had done something different.

Results on 75 meter SSB were also excellent, but because I had cut it for 4.0 MHz, the antenna would not load up on the CW portion of 80 with my FT-920's internal tuner. This proved my point that you should cut the antenna for the lowest frequency for which you intend to use it. Incidentally, I highly recommend this antenna for MARS, state EMCOMM, or area NCS stations needing solid area coverage.

I might add that when I built this antenna, I understood the loop would work on 6 meters, but I personally doubted its effectiveness. Just for fun I gave it a try on 6 and, once again, I was very surprised at how well it worked on an area 6 meter net. The loop was as good as or better than my full-size 6 meter copper "J Pole" antenna at 30 ft, and when the band opened a bit, I worked all up and down the East Coast from my Alabama QTH where I was living at



Fig 2: The 4:1 Balun and strain insulator.

the time.

Loops, in general, are considered to be quieter than many other antennas, and my personal experience has shown that this antenna was quieter than my G5RV strung horizontal or than an inverted "V" at the same height. I also found that signals were stronger on the loop than on my 40-10 meter 31-ft vertical, which used with sixteen 27 foot-long buried radials and a 1:1 balun. I could copy signals with the loop that I could not copy at all on the vertical. In 120 days of operating on the loop at my new location, I have worked all states and more than 60 countries on PSK-31 using only 5 watts of power or less.

I also use this loop on my 10 meter QRP beacon anytime I am not using it on the air or listening with it on HF. I find that it performs better as a beacon antenna (more received beacon reports) than the vertical or ground plane antennas that I used before the loop. It also seems to copy other beacons better, but with the poor conditions that come and go, it's sometimes hard to tell about the receive side on 10 meters.

Simply stated, this version of the venerable 80-6 meter loop will take you about anywhere you want to go on HF without changing anything but your band switch. Simple to make, easy to put up, and very effective, **MT**

All-Band HF Loop Antenna Parts and Price List

300 feet of 17 gauge aluminum fence wire: \$20
for 1/4 mile roll from Tractor Supply Company
Rope insulator supports: \$15/100' dark, braided Polyester from Universal Electronics
Dog bone insulators (4): \$4 from Universal Electronics
4:1 balun: \$30 from Universal Electronics
RG/8X coax (amount necessary to get from the loop to your shack): \$35/100' with PL-259 connectors at each end from Universal Electronics.
CoaxSeal: \$3 for a 5 foot roll from Universal Electronics
Non-oxidation aluminum paste: \$3 from ACE Hardware
Total cost (less shipping): About \$110

A Most Unlikely Radio Career

By Keith Perron
(Photos courtesy the author)

When I think back about how my interest in radio started, as a young person growing up in Canada, it seems like it was just yesterday. I remember being mesmerized by the strange sounds coming out of the radio speakers from stations like Radio Moscow, Radio Japan, Radio Netherlands and so many others.

As I got more interested in what radio could do and its power, I found myself being drawn more to the creative process of putting programs together. In the evening I would record some of my favorite programs and then listen to them over and over again, paying close attention to the details like audio mixing, presentation styles, and personalities.

The Netherlands Connection

One of the personalities from the shortwave dial that would have a tremendous impact on my own style of presentation was Tom Meijer of Radio Netherlands Worldwide (RNW). Tom's easy, laid-back approach to radio was one of the reasons that I wanted to go into radio. From the early 1980s onwards, I would tune in every

Sunday not only to the English version he presented, but also the Spanish version of Happy Station. In fact, one of my uncles has a recording I made on a small tape-recorder doing an impression of Tom during that period.

The source of inspiration for the kind of radio I do also came from others, mostly from Radio Netherlands broadcasters like Dody Cowan, Ginger de Silva, Pete Myres, Swiss Radio International's Bob Zanotti, and so many more. The list is endless. What is most fun is that I have become close friends with all of these people and in fact, since 2010, I've been freelancing for RNW.

One of the best times I've had in my over 20 years in radio was in 1993. I was in the Netherlands visiting Tom. This was just a few months after he had left Happy Station. At that time he was living in Hilversum, and I remember getting on my bike and heading to the Wereldomroep, walking past the reception area and meeting some people I already knew who were watching the activities in the newsroom.

On this particular afternoon, I ran into Pete Myres in the elevator. We got into a conversation that must have lasted hours. At one point I asked him if he would be interested in doing



Taiwan superstar Wang Lee Hom taken in the studios at Central Broadcasting from a series we have been doing for Taiwan radio since 2005.

an interview for a show I was doing in Canada. We fixed a time the following afternoon to meet in his office on the second floor of Radio Netherlands. It was an interview I will always remember and, as I'm typing away right now, I have the original tape of that conversation running. It's fun to listen to, because both of us were insane and it shows.

At the end of the interview I asked if he could record some show IDs for me. This is when the fun really started. I'm not joking: to record two 30-second IDs took almost one hour. I never laughed so much in my life. As I listen to the tapes of that day it was just as if it happened yesterday.

Career Changing Holiday in Cuba

Three months after I returned to Canada, I went down to Cuba for two weeks' vacation. Little did I know that a few months later I would be back, this time working at Radio Havana Cuba (RHC).

Being a person who is very curious about radio, it seemed very normal, during my holiday, to head to RHC, say hello and look at how they do things. That afternoon, while I was sitting in the English newsroom with Jorge Myaries, as a joke I asked, "Do you have any positions for foreign staff?" I didn't realize he had taken me seriously.

On a very cold Canadian afternoon, he called me up asking if I would consider coming to Havana for one year. With the outside temperature being -10 and, having just been laid off from Radio Canada International, I said "Yes!" in seconds and found myself back in Havana at RHC headquarters two months later.

Working for Radio Havana Cuba was, in all honesty, one of the best radio jobs I ever had, because I loved what I was doing there and the people. I worked with people to whom I had listened for years, including Yolanda Fisher, Telma Rodrigues (with whom I would eventually work again at China Radio International some 12 years later), and of course Arnie Coro CO2KK. I have so many fond memories of the station.

One of my closest friends at RHC was, and still is, Manolo de la Rosa who has been with RHC for over 30 years and who spent 12 years at Radio Moscow as well. I have so many memories of going over to his house on Sundays for dinner with his family, sharing a bottle of rum and talking about everything under the sun.



Radio Havana Cuba English Service announcer Telma Rodriguez and myself standing in front of China Radio International.

The Road to China

I think that returning to Canada after leaving RHC was the biggest mistake in my life. A period of depression seemed to settle in. I found myself working on local radio – not that I didn't enjoy it, but from that point on for the next four years, I found myself in a rut. I still loved working in radio, but I had lost my passion for it. Then, one morning I woke up and decided to quit. Two weeks later I packed up and moved to British Columbia to do something different for a while.

I took a position at the Virgin record store in Vancouver as the jazz buyer, but after doing that for six months, I realized I wanted to get back into radio. One afternoon, as I was looking on the shelves at what Miles Davis CDs needed to be stocked, I happened to meet James Ho. James is the owner of CHMB-AM 1320 Vancouver, one of the oldest Chinese radio stations in Canada.

We started talking and a month later he called and asked if I would be interested in coming to work for him. I said, "You've got to be kidding. Why do you want me to go work for an all-Chinese radio station? What could I do?" He offered me the position of Head of International programming. It turned out that CHMB runs programs for the other large ethnic communities in Vancouver.

The job was very interesting and lots of fun. It was here that I fell in love with Chinese culture. I stayed at CHMB until 2001 when, just as had happened to me before, totally by luck, I was offered a position I could not turn down with China Radio International (CRI) in Beijing.

The job at CRI was interesting. Did I love it? That's hard to say. Did I hate it? That's hard to say, too. I think the problem I had with China Radio International was that it is so bureaucratic, that getting anything done was extremely time consuming. I had and still do have great fondness for my co-workers, but as for management, well, that's another story.

After nearly five years, I decided to call it quits and took a position at the Beijing Radio Corporation to help launch a new 24-hour English station called Radio 774. After we got



The cast and crew, including actor Jackie Chan, from a television series I did in 2004.

the station up and running, I started to lose my interest in radio again. So I quit, took some time off, and opened a café in the Dashanzi Art Area of Beijing.

In 2008 I was offered a job with a local radio station in Taiwan. I packed up everything I had and moved again. This time, after nearly 12 years, I found something that I felt when I was living in Cuba, and it was as if I had found a new source of energy. Being a huge jazz fan, I jumped at the chance to host a nightly two-hour live jazz show. In the move to Taiwan, it's as if everything came full circle.

Happy Station Reborn

One night, after talking to Tom Meijer, I remembered thinking back to the late 1980s and that the show I had always wanted to do was Happy Station. Now, you need to remember that Happy Station left the airwaves in 1995, after it was cut by Radio Netherlands Worldwide. But,

many years ago, Tom and I had discussed the idea of doing the show as an independent production. So, in January 2009, I thought, "Why not put together a one-off Happy Station Show, buy air time on WRMI, put it on shortwave as a tribute to Tom and his 22 years as host?"

Well, the idea kind of snowballed. The one-off special turned into a new show once every two weeks, to weekly, to three different editions weekly, to other local stations around the globe picking it up. All this led to the founding of what would be called PCJ, named for Radio Netherlands's predecessor, PCJJ, a radio station founded in 1928 when Philips Radio started broadcasting. The call was later changed to PCJ, which original Happy Station host, Edward Startz, said stood for Peace, Cheer and Joy.

Eventually there were more PCJ productions, live relays of PCJ Radio, and so on. All this happened so fast that I still can't imagine how I pulled it off.

Of everything I have done in the last 20 years, the two things I am most proud of are bringing back Happy Station and starting PCJ Media and Radio. But, I need to add that I could never have done it alone. Tom plays an important role, as well as so many others. But one person, whom I have never met face to face (and would even go so far as to say is the silent voice of PCJ) is Colin Newell of the DXer.ca website. Colin took the Happy Station idea and PCJ into the 21st century by helping to build a fantastic website.

Over the years, I have learned so much and continue to do so. Now, as I'm soon to be 40 years old, I have people asking me for advice, just as I did 20 years ago.

The only advice I can really give is: if you want to go into radio, make mistakes, have fun, and find out who you are as a broadcaster. But above all, the most important thing is passion. Passion for the medium is what should drive you. Second, don't expect to be rich. If you want to be wealthy, become a lawyer. And finally, don't treat the audience like idiots. Talk *to* them, not *down* to them and have fun! If you have fun, your audience will have fun.

MT



A picture of myself re-recording a Happy Station "On the Road" show from August, 2010 in Kenting, Taiwan.



SCANNING REPORT

THE WORLD ABOVE 30MHz

Dan Veeneman

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Scanning: A Moving Experience

Changes to scanner frequency assignments are a fact of life. From public safety rebanding to new services and technologies, knowing where to find your favorite activity and searching for new ones is part of the fun of our hobby.

This month we examine the ongoing effects of moving 800 MHz public safety operations to avoid interference and explore a little-known segment of the VHF band. We finish up with some frequencies and tips from a reader in Arizona.

❖ Rebanded

Dan,

I have a 396T that I use in my travels. I wish to track both 866-869 MHz Motorola systems and their re-banded 851-854 MHz systems.

1. Will a reprogrammed 396T still track the 866-869 MHz systems?

2. Do new scanners programmed for re-banded Motorola systems still track the 866-869 MHz systems?

3. Must I take two scanners to track both types of systems?

Thanks,

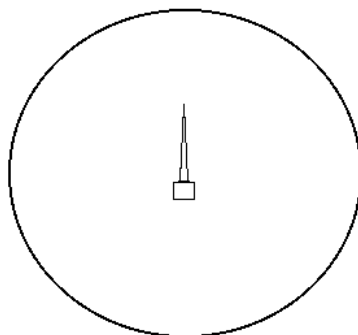
Larry via the Internet

As we've discussed previously in this column, the Federal Communications Commission (FCC) reorganized a portion of the 800 MHz frequency band used by public safety agencies. Prior to the reorganization, both public safety and private radio operators shared the spectrum between 851 and 861 MHz. In much of that space, frequency assignments were interleaved, meaning that public safety systems and private networks operated right next to each other.

Over time, as private radio operators like Sprint/Nextel expanded their network and added transmitters across the country, public safety agencies began to experience interference. The numerous, lower power Nextel transmitters were spilling over into the adjacent public safety frequencies and overwhelming the few, higher power public safety repeater sites, resulting in police and fire departments having difficulty communicating with their personnel in the field.

As these episodes of interference increased in duration and intensity, complaints were filed with the FCC to correct the problem. The primary culprit, Nextel, was either

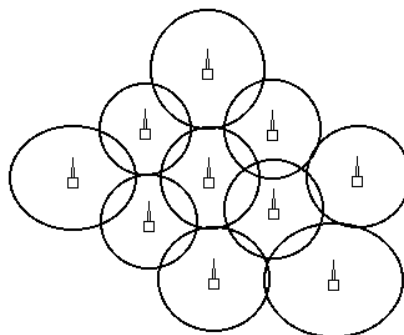
unwilling or unable to keep their transmissions within their assigned frequency slots, and older public safety radios had insufficient filtering and selectivity to keep out the Nextel signals.



Large coverage area of typical public safety repeater.

After a long period of bureaucratic wrangling, in 2004 the FCC finally issued an order to "reband" the part of the 800 MHz band where interference was occurring. The plan was, in essence, to separate the two sides and give each of them their own contiguous blocks of spectrum. The result is that public safety now has the exclusive use of frequencies between 851 and 854 MHz, and shared use from 854 to 860 MHz.

Nextel and the other Enhanced Specialized Mobile Radio (ESMR) have the exclusive use of frequencies between 862 and 869 MHz. Any public safety systems that previously operated in the old allocation between 866 and 869 MHz must "vacate" that segment and move down into available space below 860 MHz.



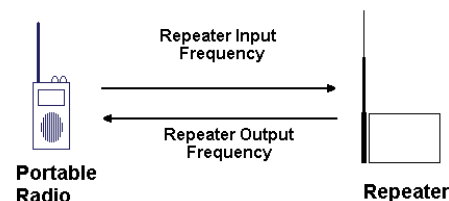
Numerous small sites for typical Nextel coverage area.

The frequencies dedicated to public safety in this band are referred to as NPSPAC (National Public Safety Planning Advisory Committee) and run from 851 to 854 MHz.

Public safety and non-cellular Specialized Mobile Radio (SMR) share the spectrum between 854 and 860 MHz. These SMR operators work more like public safety systems, with a few high-power repeater sites and are far less likely to cause interference.

The FCC also allocated a one-MHz expansion band from 860 to 861 MHz as a set-aside for future needs and an additional one-MHz guard band from 861 to 862 MHz to help prevent interference.

Remember that channels are actually pairs of radio frequencies; the frequencies listed here are for the output of the repeater site, which is what scanner listeners usually monitor. There is also an input frequency to the repeater that is exactly 45 MHz lower than the output frequency. Both frequencies were rebanded and maintained their 45 MHz separation.



Under the FCC order, Sprint/Nextel must pay for the cost of the rebanding effort public safety agencies undergo. The vast majority of these license holders have completed agreements with Sprint/Nextel, although systems located along the U.S. borders have been slow to begin the process. As of July, about half of the 800-MHz public safety license holders not near a U.S. border have finished moving to their new frequencies.

What rebanding means for scanner listeners depends on the type of system that had to move down. First, regardless of type, whether Motorola, EDACS, LTR or Project 25, the rebanded system will have a new list of frequencies that must be programmed or loaded into the scanner. For EDACS, LTR and pure Project 25 digital systems, this is all that has to be done – just plug in the new frequencies and you're good to go. Unfortunately, Motorola systems have an additional complication, due to the way channel information is transferred across the control channel.

Motorola Type I and Type II systems use the standard SmartNet control channel, usually called "3600-baud" in reference to the rate of data transfer, which conveys channel information through the use of channel

800 MHz CONFIGURATION (OLD)

Mobile Transmit Frequencies				
806	809.75	816	821	824
General Category	Interleaved Spectrum	ESMR	NPSPAC	
851	854.75	861	866	869
Repeater Transmit Frequencies				

800 MHz CONFIGURATION (REBANDED)

Mobile Transmit Frequencies				
806	809	815 816 817		824
NPSPAC	Public Safety Non-cell SMR	E	G	ESMR
851	854	860 861 862		869
Repeater Transmit Frequencies				

numbers rather than actual frequencies. When a radio receives a Motorola control channel message with a channel number, it performs a mathematical algorithm to determine the radio frequency it should tune to. Because the channel numbers were originally set up and assigned long before rebanding, the algorithm produces the wrong frequency for channels between 851 and 854 MHz.

So, for any rebanded Motorola system that has any frequencies between 851 and 854 MHz, something has to be done. The question becomes, can the algorithm in the scanner somehow be fixed or updated? As you might expect, the answer depends on the particular scanner.

Older trunk-tracking scanners have the algorithm built into hardware and it cannot be upgraded without changing a circuit board, if such a board were even available. More recent scanner models have the algorithm implemented in firmware, which is something a user might be able to upgrade, depending on the specific model.

Manufacturers have corrected the algorithm in the firmware for newer scanners to allow them to properly track both the old (866 to 869 MHz) as well as the new (851 to 854 MHz) rebanded systems. The corrected algorithm, along with other fixes and improvements, are included in new versions of firmware. These new versions are typically provided via a download link on the manufacturer's web page, so if you have a newer model scanner it is worth checking to see if you have the latest version.

Manufacturer Web Site

GRE	www.greamerica.com
MFJ Enterprises	www.mfjenterprises.com
Radio Shack	www.radioshack.com
Uniden	www.uniden.com

The following is a list of scanners that are known to support rebanded Motorola systems, either through a firmware update or a change to internal settings.

Manufacturer Scanners

GRE America	PSR-300, PSR-310, PSR-400, PSR-410, PSR-500, PSR-600 and PSR-700
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MFJ	MFJ-8322
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Radio Shack PRO-106, PRO-107, PRO-160, PRO-162, PRO-163, PRO-164, PRO-197, PRO-2096, PRO-92 and PRO-96

Uniden B C 2 4 6 T, BC296D, BC346XT, BC796D, BC898T, BCD396T, BCD396XT, BCD996T, BCD996XT, BCT15, BCT15X, BCT8, BR330T and the Home Patrol

Uniden BCD396T

The Uniden BCD396T is a handheld scanner introduced in 2005. It has memory for 6,000 channels and is capable of scanning both analog and digital Project 25 networks, including Motorola, EDACS and LTR trunked systems.

Support for rebanding requires firmware version 3.0 or newer. You can read all about firmware versions and the upgrade process for the BCD396T at

<http://info.uniden.com/twiki/bin/view/UnidenMan4/BCD396FirmwareUpdate>

So, for Larry's questions: Yes, a BCD396T with most recent firmware will properly track both rebanded and non-rebanded systems. Yes, new scanners with the proper firmware will also track both types of systems. No, you don't need to bring two scanners just to cover rebanded and non-rebanded systems – one modern scanner with updated firmware will handle both types.

Low Band

Greetings!

Just above the 10-Meter amateur radio band, what are the frequencies between 29.700-30.000 MHz used for?

I know of logging and papermaking operations: 29.710 to 29.790 MHz every 20 kHz and US Military: 29.900 and 30.000 MHz.

As the solar cycle improves, who else uses this 300 kHz sub-band?

In the past, I once heard about a local disgruntled ham that heard "pirates" on 29.710 FM, and he went out of the amateur band to berate them. This continued until the polite operator informed him that they were a logging company in Washington State...and would he kindly repeat his call sign so they could report him to the FCC. He vanished.

Are there any other FM-mode frequencies in the 25-30 MHz range to monitor now? I recall oil rigs used to use the 25 MHz range, and some business radios use FM in the 27 MHz range between 11M and 10M.

Bob via the Internet

The low end of the VHF (Very High Frequency) band can be an interesting place to explore. Scanner listeners usually spend their time monitoring frequencies in the UHF (Ultra High Frequency) band or higher, hunting for transmitters that are located a few dozen miles

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away, at most. Radio waves at these frequencies typically travel short distances and are blocked or absorbed close to where they originate.

In contrast, transmitters operating at low end of the VHF band around 30 MHz are capable of carrying significantly further. Under the right conditions, these radio waves can travel hundreds and even thousands of miles as they bounce off the ionosphere high above the Earth. This phenomenon is sometimes referred to as *skywave* propagation.

The daily day/night (diurnal) cycle affects long distance propagation of low frequency signals as the energy from the daytime Sun energizes the upper atmosphere and increases the likelihood of signal "skip." The longer-term output variability of our Sun also affects signal propagation, as periods of increased sunspot activity charge the ionosphere. Sunspots typically wax and wane in an 11-year cycle, and we are currently coming out of a low in that cycle. Historically, the low frequency signals around 30 MHz are more likely to reach distant radio listeners during periods of increased sunspots.

❖ Ten Meters

Way back at the dawn of the radio era, the segment between 28 and 30 MHz, called the "10-Meter Band" due to the length of radio waves at those frequencies, was allocated to amateur radio. Early hams used these frequencies to make long distance contact, often communicating between continents.

Two decades later, just after World War II, the small segment of spectrum from 29.7 MHz to 30 MHz was reallocated for government and private use. The same propagation advantages were used to provide longer distance communication between mobile units and their fixed location headquarters.

The 300 kHz sub-band is allocated as follows:

Frequency Range	User	Category	Use
29.70 to 29.80	Non-Federal	Land Mobile	Mobile operations
29.80 to 29.89	Non-Federal	Fixed Site	International, Aviation
29.89 to 29.91	Federal	Fixed and Mobile	varies
29.91 to 30.00	Non-Federal	Fixed Site	International, Aviation

Currently there are more than two dozen active, standard license holders in the non-Federal portion of this sub-band, including oil service, forestry and papermaking companies. For instance, the International Paper Company



operates from a number of locations on 29.73 MHz. Weyerhaeuser uses 29.75 and 29.77 MHz (as well as 31.08 and 31.12 MHz). A couple of towing companies out of New Hampshire use 29.71 and 29.77 MHz to coordinate the operation of their vehicles and personnel. Two different professional search and



rescue operations are licensed for a number of frequencies in VHF, including 29.71 and 29.75 MHz. There is even a food service operation in Virginia licensed to use 29.79 MHz.

Although there are more than 500 active licenses granted in this sub-band for demonstration purposes, you may not hear much from them. Equipment manufacturers and dealers often use these licenses to show potential customers the capabilities of particular products, where one of the capabilities is to be able to operate in this sub-band.

Federal government use is centered at 29.90 MHz and covers 10 kHz on either side, making it a 20 kHz wide channel.

The two segments on either side of the Federal slice, from 29.80 to 29.89 and from 29.91 to 30.00 MHz, are allocated to International Fixed Public Radio Communication services and to Aeronautical fixed site stations. Here you may find long distance data transmission services that carry news, weather and other "public" information for hire as well as aviation-related data feeds.

Other countries also make use of this sub-band. Because the radio signals can travel such great distances, you may hear Brazilian taxicabs, Spanish delivery services, British military operations, Mexican telephones, and a variety of other voice traffic in many foreign languages.

I would recommend setting up a limit search between 29.70 and 30.00 MHz in narrowband FM (NBFM) and let it run. When the propagation characteristics are right, you may hear quite a few interesting transmissions. Please keep a log and let us know what you find!

❖ Phoenix Update

Thank you for printing up my fast food window intercepts from Phoenix, Arizona. I do not have a digital capable scanner, yet, so I focus on non-trunked, non-digital scanner communications.

To discover even more retail and restaurant frequencies, it's helpful to ask the people who work there what brand and model of radio they use, because you would like to purchase said model for your business. That way, they don't have to tell you what frequency they are on...even if they know.

Then look up the radio model on Google. For our local "Castles N' Coasters" amusement park in Phoenix, near Metro Center, I asked the manager about his Motorola BPR40 radio, then simply looked up the VHF factory programmed channels: 151.625, 151.655, 151.685, 151.715, 151.775, 151.955, 154.570 and 154.600 MHz.

Note that 154.570 and 154.600 do not need an FCC license under MURS (Multiuser Radio Service) regulations.

Likewise, a number of Phoenix area businesses operate Motorola radios using these common frequencies: 464.500, 464.550, 467.7625, 467.8125, 467.850, 467.900 and 467.925 MHz.

Bridge and highway repair contractors



Scottsdale Fashion Square (courtesy mall-hall-of-fame.blogspot.com/)

use Special Industrial frequencies around Phoenix: 158.400 and 451.800 MHz

Check www.scannerstuff.com for the "Southwest Frequency Directory" and the "Phoenix/Tucson Metro Guide" for exhaustive and confirmed Arizona scanner frequencies collected by local public safety officials and scanner hobbyists. They have a long list of even more business frequencies in the appendix, but the above VHF and UHF frequencies will offer an amazing variety of users.

Some local scanner fans got a visit from mall security in our valley Westcor Malls. It seems like scanners aren't welcome inside the malls – but signals have an annoying habit of travelling beyond mall property. So, I just sit in a restaurant outside mall property, put my scanners on limit search, or automatically log frequencies with the Yaesu Smart Search.

And, when I go into the malls, I always dress like I work there, and listen only with an earphone. I've followed this policy for years – and never had security ask anything about the scanner. Police, mall security, and mall management have told me they thought I was a janitor, sales representative, or even a security officer myself.

Yes, I can hear an amazing variety of behind-the-scenes business and recreation radio with only analog, non-trunking scanners!

Federal agencies such as the DEA and Bureau of Land Management still use some non-P25 radios, too.

And, even though our police agencies use trunked digital communications, the helicopters must go on the VHF aero band to keep a safe distance from each other:

- 123.025 Police, Fire and Air Ambulance Helicopters.
- 123.550 "Company", used by PD helicopters, air-to-air
- 154.280 Fire Department Intersystem. No PL tones, but many helicopters!

73, Robert in Arizona

That's all for this month. More information is available on my web site at www.signalharbor.com, including links and additional scanner data. Please continue to send your questions, comments and frequency lists to me at danveeneman@monitoringtimes.com. Until next month, Happy Halloween and happy scanning!



Sharp-eyed engineer David Hindin pointed out an error in my August column. In my discussion about two-way signal splitters, I should have said "...you will lose 3 dB since the original signal power (*not voltage*) is now divided in half to feed both receivers." I should also point out that, in addition, there will be some minor resistive loss in the windings as well.

Q. *I have a problem with two local AM broadcasters. I hear them not only on their assigned frequencies of 1480 kHz and 1300 kHz, but on multiples of 1480 kHz. Does this mean my radio is defective? (MB, IN)*

A. While radios can be overloaded producing spurious responses like this, in some cases, external environmental objects like corroded metal junctions can do the mixing and radiate the products you are hearing. It's also possible that the local broadcaster is radiating harmonics at a level that can produce mixing under the right circumstances. There are some things you can do to test whether it's the radio or not.

First, try another antenna like a short piece of wire that reduces the signal strengths. If the radio has an attenuator switch, you can use that instead. With the radio on its present antenna, mark down the S-meter level when you are listening to 1480 kHz or 1300 kHz, and also the level from one of the spurs (spurious signals).

Now use the shorter antenna or attenuator and mark down those new, lower levels. If the drop in level on a spur is much greater than the drop on the fundamental signal, the problem is overload intermodulation ("intermod") of the radio. If the drop in level is about the same, then it's external to the radio.

Q. *I'm getting a continuous scratching sound on my scanner that I think may be coming from my home. How can I tell what's causing it? (Raymond C. Wood, Brattleboro, VT)*

A. In order to thoroughly diagnose the problem, I would need to know

1. Is it a hand-held scanner or a desktop unit?
2. Are you using the attached whip or an outdoor antenna?
3. Do you get the interference on all frequencies or just some?
4. Do you sometimes receive desired signals or not?
5. Can you set the squelch to a level that eliminates the static?
6. If you remove the antenna, does the noise disappear or become noticeably less?

If the noise does disappear or reduce when the antenna is removed, then the source of interference is in your home. If that's the case, and you have a hand-held scanner, you can walk from room to room, adjusting the squelch as you go, even removing the antenna (or shortening it if it's adjustable) if it's too strong, to find the offending source.

Sources of electrical interference in the home may include washers and dryers, wall adapters and chargers (switching type), home entertainment centers, computers, and other electronic accessories.

If the source is local, say, one room location, you must either move the offending device or your antenna further away from the device. Usually, an outdoor antenna with well-shielded coax lead-in is the best solution.

Q. *When transmitting roughly 100 watts on the 17 and 20 meter ham bands, my CO2 alarm goes off. Could you elaborate on just what causes this? (Mark Morgan, N8QIK, Cincinnati, OH)*

A. When RF voltages are impinging on wiring, they do strange things. Often they are rectified and delivered to parts of the affected equipment that are sensitive to any change in voltage levels, such as detectors of various sorts.

I suspect that's probably what happens to your CO2 detector – it interprets the increase in electrical voltage the same as if its sensor was sending the voltage, thus triggering the alarm.

Q. *Since switching-type power supplies generate high-frequency AC (typically in the tens of kilohertz) from DC for more efficient and compact power conversion, can commercial switching power supplies like the Jetstream JTPS30M operate from both AC and DC 120 volt sources? (JJ Owens, NC)*

A. We checked with Jetstream and they said no, their power supply will only operate from an AC power line.

Q. *What is Litz wire and why was it used in early radio? (Mark Burns, Terre Haute, IN)*

A. Radio frequency (RF) currents have a tendency to travel near the surface of a wire, not all

through it; hollow wire would work just as well. The higher the frequency, the more the RF currents migrate toward the wire's "skin."

The principle advantage of Litz wire over other kinds of wire is its ability to reduce the resistive nature of "skin effect" below 1 MHz or so; that's why it was popular in the early days of radio, but is rarely used now at radio's higher frequencies.

Litz wire is a woven wire – fine wires separated from each other by interwoven strands of cloth insulation. As a result, the RF currents have several conductors for them to travel near the surface, thus reducing the resistance they would encounter with only one conductor.

Q. *Growing up with radio, I survived the change from megacycles to megahertz. I learned that resistance is measured in ohms, kilohms (x1000) and megohms (x1,000,000). Capacitance was in microfarads and picofarads, so what the heck is a nanofarad?*

A. As in your example, most scientific units of measurement are conveniently classified in intervals of 1000, indicated by the prefixes pico, nano, micro, milli, kilo, and mega. Exceptions to these units are found commonly.

Capacitance is usually measured in microfarads and picofarads, separated by a multiplier of 1,000,000 (1 microfarad = 1,000,000 picofarads). To conform to the standard classification scale and thus avoid awkward decimal values, the nanofarad is sometimes used. Thus, a 0.001 microfarad (1000 picofarad) capacitor is also 1 nanofarad – simply a shift of the decimal three places. Here's the way it looks:

pF (picofarad)	nF (nanofarad)	uF (microfarad)	Farad
1,000	1.0	0.001	*
10,000	10.0	0.01	*
1,000,000	1,000	1.0	*
*	10,000	10.	*
*	100,000	100.0	*
*	1,000,000	1000.0	0.001
*	*	10,000	0.01
*	*	100,000	0.1
*	*	1,000,000	1.0

But cheer up, the use of microfarads and picofarads is still far more common.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)



New Arctic NAVAREAs Promise Utility Catches

On July 1, three international agencies began their one-year phase-in of five new NAVAREAs and METAREAs for the Arctic waters. These new areas, by definition, will provide maritime safety and weather information to ships anywhere inside their boundaries. This will certainly require some building onto existing radio assets and, conceivably, even an expansion.

A NAVAREA is a specific world oceanic zone in which a coordinating agency, usually a government, is responsible for navigational warnings. Up until July, there had been 16 of these, given the Roman numerals I through XVI. This previously existing system had been agreed upon before climate change increased navigation in the Arctic. Therefore, all areas stopped at a northern boundary of 65-69 degrees north latitude.

A METAREA is a similar zone, with the same boundaries, in which a coordinator becomes responsible for the timely broadcast of weather information. Arctic conditions can deteriorate very rapidly, making such a service essential. The five new METAREAs will have the same lead agencies as the NAVAREAs.

Radio schedules are going to need some adjustment to make this all work within the internationally defined Global Maritime Distress and Safety System (GMDSS). In particular, this affects the GMDSS SafetyNET broadcasts.

Due to presently limited satellite coverage in the higher latitudes of this region, the compulsory SafetyNET system will at least start out relying heavily on narrowband direct printing. This will bring some changes to Navigational Telex (Navtex) schedules, and in fact some listeners have noticed testing has already begun. Navtex is on 518 and 490 kilohertz (kHz) in a printing system called SITOR-B (Simplex Telex Over Radio, mode B).

Similar SITOR-B schedules may also appear on high frequency (HF), with its greater propagation range providing the hobbyist a good opportunity for distant transmitter chasing (DXing). Of course, it's also possible to DX Navtex, and in fact the intended low coverage makes it quite a challenge. Fortunately, propagation down there can be very steady on long winter nights. Periods of low noise allow some amazing catches.

The new NAVAREAs and METAREAs are numbered XVII (17) through XXI (21). While other such world areas in this system are sharply defined, these new ones will ultimately overlap to ensure timely warnings.

In some cases, this will require installation of new firmware in GMDSS equipment.

Here are the locations of the new NAVAREAs/ METAREAs, minus this future overlap:

XVII: North from 67 degrees latitude, above the Alaska and Canada coasts from 168.58 to 120 degrees west. Canada is the coordinating government.

XVIII: Continuing north of Canada and the 67th parallel to 35 degrees west. Again, Canada is coordinator.

XIX: Continuing north of Greenland at 35 degrees west to 30 degrees east. The southern boundary is 75 degrees north to a point north of the UK, then 65 north. Norway is coordinator.

XX: North of Norway from 30 east, continuing north of Russia to 125 east. The Russian Federation is coordinator.

XXI: North of Russia from 125 east back to 168.5 west and 67 north. Again, Russia is coordinator.

Here are the tentative broadcast schedules for the new areas. Since this is still in a testing mode, changes will probably occur. All times are Coordinated Universal Time (UTC).

XVII: 0300, 1130, 1500, 2330

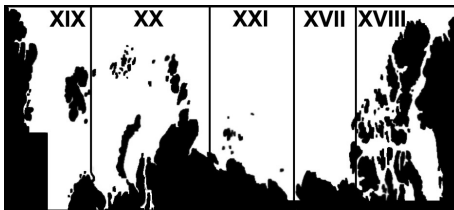
XVIII: 0300; 1100, 1500, 2300

XIX: 0630, 1100, 1830, 2300

XX: 0530, 0600, 1730, 1800

XXI: 0600, 0630, 1800, 1830

We'll have more on this situation as it evolves. Meanwhile, keep an ear out for tests and new schedules.



❖ Korean Numbers Update

After the August column, I received a great e-mail from "Token," the well-equipped California listener who specializes in Asian numbers. This listener has continuously monitored the Korean numbers stations for several years, on all known frequencies.

Cutting to the chase, let's update the frequency list that ran last month. The current frequencies for this station are 5715.0, 6215.0, 6330.0, and 6730.0 kHz amplitude modulation (AM). Not every frequency is active every day. At the beginning of 2010, the 4500.0 and 4600.0 kHz frequencies were dropped, and nothing has

been heard on these since. 4940.0, 5500.0, and 6715.0 went silent sometime earlier.

Token also filled in some good information for the Morse code sister station, which is designated M94 by the European Numbers Information Gathering and Monitoring Association (ENIGMA). M94 uses 5715.0 and 6330.0 kHz, in modulated continuous wave (MCW) mode. M94's MCW variant uses on-off keying of an audio tone with a continuous carrier wave, allowing AM reception on simpler radios.

Note that M94 uses some of the same frequencies as the voice station, which ENIGMA has designated V24. M94 has cut back somewhat in 2010, converting most of its time/day of month/frequency slots to the voice V24. More details of M94 are at http://home.mchsi.com/~token_radio/numbers_station_m94.htm

Interestingly, all time/day of month/frequency slots get used two months in a row. Introductory music stays the same, but the message changes. Unlike most other musical numbers stations, V24 often changes its music. Token notes around eight songs in use as of mid-2010.

It is probably significant that all of these current musical selections are of interest primarily in North Korea. One might speculate whether a particular music choice has some kind of a message content in itself.

More details of V24 are at http://home.mchsi.com/~token_radio/numbers_station_v24.htm

All transmissions of both stations are thought to take place between 1200 and 1630 UTC. The 2200 UTC transmission mentioned last month for V24 could well have been someone writing down the wrong time, as I can find nothing more about it.

More about V24 and M94, with a somewhat dated schedule (as of press time) is at http://home.mchsi.com/~token_radio/v24_m94_scheduleV2.htm. The coming autumn season should help anyone outside Southeast Asia trying to hear these stations.

❖ Russian Spy Update

Soon after we went to press on the US government arresting a number of alleged Russian spies, all suspects pleaded guilty to a misdemeanor charge of failure to register as foreign agents. In one of those tit-for-tat diplomatic deals, all were immediately sent back to Russia in return for that country's freeing several Americans being held over there.

This brings to an end the latest "Russian Spy" case. Since it will never go to trial, we will never know exactly how radio figured in whatever espionage activities actually happened. This is too bad. Any testimony regarding use of the Cuban numbers transmissions (ENIGMA V02a and M08a) by Russian agents operating in the USA would have answered some persistent questions. So it goes, in the numbers scene.

❖ COTHEN Frequency Use Update

COTHEN, as we know, stands for (US) Customs Over-The-Horizon Enforcement Network. It started out using a proprietary scanning mode, and then it modernized to a more flexible Automatic Link Establishment (ALE) system. As its use enlarged from anti-smuggling ops to include such US Coast Guard missions as flight following, COTHEN began adding new frequencies to its original 11 channels.

This column's COTHEN project began as an attempt to determine who was using the new frequencies and who wasn't.



A spreadsheet was prepared which counted the number of different stations logged on each frequency, broken down by ALE addresses (call signs).

This was done daily for about a month, at which point the same stations and frequencies were repeating pretty much all the time at this location. However, the project has since been greatly expanded to include a huge log of ALE hits graciously provided by *MT* editor Larry Van Horn, from *MT* headquarters in Brasstown, NC. B-town is clear across the US from California, and the time of year is completely different for radio propagation. These factors greatly increase the validity of the statistical sample.

Here's the quick total by frequency, in kHz, with the new ones starred. They are ranked by number of different stations heard: 8912, 105; 10242, 103; 7527, 101; 11494, 99; 13907, 84; 15867, 66; 12222*, 56; 5732, 47; 13312*, 44; 14582* and 18594, 42; 20890, 39; 5909.5*, 23; 23214, 15; 25350, 8; 20662*, 4; 4614.5* and 5250*, 1.



Two other ALE frequencies also show up on occasion in COTHEN scans. These are 11196.0 and 17988.0 kHz. Both are from the US Coast Guard's old net called TISCOM, which stands for Telecommunications and Information Systems Command.

Several conclusions become possible, especially when the individual calls are taken into account. Right off, we can see that everyone uses the old frequencies. About half the stations also use all of the new ones. Finally, a few only add in one or two of them.

There's also a pronounced skew toward the middle of the short wave band. This is undoubtedly due to usable propagation for more hours in the day. Finally, the bottom line is this: one can scan only the old net and hear a lot, but it's much better to include the whole list and hear everything.

When this project finally ends, the whole spreadsheet will go on this column's web site. Happy fall DX season, and see you next month!

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat reQuest
AWACS.....	Airborne Warning and Control System
BOM.....	Australian Bureau of Meteorology
COTHEN.....	US Customs Over-The-Horizon Enforcement Network
CW.....	On-off keyed "Continuous Wave" Morse telegraphy
DHFCs.....	UK Defence High Frequency Communications Service
DSC.....	Digital Selective Calling
EAM.....	Emergency Action Message
E07.....	Russian Intelligence "male" machine voice
FAX.....	Radiofacsimile
FEMA.....	US Federal Emergency Management Agency
G11.....	German version of "Strich" family
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
LDOC.....	Long-Distance Operational Control
LSB.....	Lower Sideband
M08a.....	Cuban CW/MCW numbers, cut to ANDUWRIGMT
M18.....	Russian, continuous 24-hour times in CW text
M89.....	Chinese military 4-figure changing CW calls
MARS.....	US Military Auxiliary Radio System
MCW.....	Modulated CW, tone or AM
Meteo.....	Meteorological Office
MFA.....	Ministry of Foreign Affairs
NASA.....	US National Aeronautics and Space Administration
NAT.....	North Atlantic air route control, families A-F
PR.....	Puerto Rico
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
Selcal.....	Selective Calling
SHARES.....	SHARed RESources, US Federal frequency pool
SITOR.....	Simplex Telex Over Radio, modes A & B
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
USAF.....	US Air Force
USCG.....	US Coast Guard
V02a.....	Cuban Intelligence, Spanish 3-message format

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

60.0	MSF-UK National Physical Laboratory, Anthorn, CW standard time signals at 0002 (Ary Boender-Netherlands).
75.0	HBG-Swiss Federal Metrology Office, Prangins (Geneva), CW standard time signals at 0003 (Boender-Netherlands).

77.5	DCF77-German Physical and Technical Institute, Mainflingen, AM and phase-modulated standard time signals, at 0004 (Boender-Netherlands).
426.0	KPH-Maritime Radio Historical Society (MRHS) "Night of Nights" CW event, Pt. Reyes, CA, at 0500 (Hugh Stegman-CA).
472.0	NMC-USCG Campspac Pt. Reyes, CA, for CW "Night of Nights," also on 6382.9 and 8573.9, working possible call KTMV195, at 0446 (Stegman-CA).
2070.4	BPLEZS-German Water Police, Cuxhaven, working BP26 (Police Boat Eschwege), also on 2505, 4618, 5258, and 8132; ALE and data at 2221 (MPJ-UK).
2142.5	ZLST-German Customs, Cuxhaven, working ZPRI (Customs Boat Priwall), and ZSHO (Customs Boat Schleswig-Holstein), also on 2673 and 3831; ALE at 2050 (MPJ-UK).
2216.0	XSS-UK DHFCS, Forest Moor, also on 2219, 2784, 4168.5, 4703, 5295, 8182, 9019, 11208, 12230, and 15040; ALE sounding at 2100 (MPJ-UK).
2971.0	Shanwick-NAT-D, Shannon/Prestwick, position and selcal check EQ-KS with USAF Air Mobility Command transport Reach 258, at 0300 (Prez-MD).
3890.0	UWS3-Kiev Radio, Ukraine, CW weather and then working river traffic, at 1934 (MPJ-UK).
3924.0	"7-L-F"-Unknown military, working Kinloss Rescue, UK, at 1944 (Michel Lacroix-France).
4247.0	KPH-MRHS, CA, CW marker, also on 6477.5, 8642.0, 12808.5, 17016.8, and 22477.5; at 0333 (Stegman-CA).
4343.0	WLO-Mobile Radio/Shipcom, AL, CW "Night of Nights," simulkeying on 8658, 12992, and 16968.5, markers and station info at 0255 (Stegman-CA).
4362.0	TARANT-Italian Financial Police, Taranto, working DENARO (Coast guard Patrol Boat Denaro), ALE at 1912 (MPJ-UK).
4426.0	VMC-BOM, Charleville, weather at 0416 (Eddy Waters-Australia).
4460.0	10111-Moroccan Civil Defense, working 11116, also on 5435, 5792, 5823, and 10390; ALE at 2025 (MPJ-UK).
4490.0	KGD34-US National Communications Center, SHARES Master Coordination Station, VA; ALE sounding at 0500 (MDMonitor-MD).
4503.0	Unid-Russian military time string station (M18), continuous CW local time at 2127 (Boender-Netherlands).
4540.0	Architect-UK Royal Air Force flight watch, working "0-6-X" and others, at 0721 (Lacroix-France).
4593.5	AFA3AJ-USAF MARS NE2S1 net control, checking in AFF3WV, WV, AFA1BT, NH, and AFA3LE, PA, at 2332 (MDMonitor-MD).
4655.0	FREDGAS-WPPY393, Washington Gas and Light Company, Frederick, MD, sounding in LSB ALE, at 0900, 1000, and 1030 (MDMonitor-MD).
4721.0	JDG-USAF, Diego Garcia, also on 4730, ALE sounding at 1926 (MPJ-UK).
4742.0	Tascomm-UK Tactical Air-Sea Communications, Forest Moor, working unknown station at 0913 (Lacroix-France).
5000.5	GS3-US military or government, calling AED (USAF, Elmendorf AFB, AK), also on 8000.5 and 11400.5, ALE at 1736 (Jack Metcalfe-KY).
5278.0	Q7NW-Chinese Military (M89), CW marker for GKVZ, at 1057 (Waters-Australia).
5583.0	"05"-Auckland HFDL, New Zealand, uplinks and squitters at 1105 (Waters-Australia).
5646.0	Unid-Saudia Airlines LDOC, Jeddah, selcal GH-JK to A330 HZ-AQB, Saudia 160, at 1938 (PPA-Netherlands).
5649.0	G-FDZE-Thomson Airlines flight 54J, a Boeing 737, position for Shannon after selcal BK-MQ, at 1939 (MPJ-UK).
5680.0	Rescue 8966-German Navy helicopter, working Helgoland and Glucksburg Rescue, at 0402 (ALF-Germany).
5687.0	DHJ83-German Air Force, Koln, selcal GM-CP to C-160 registration 50+69, at 0616 (Lacroix-France).
5708.0	ARMOR-French Navy, Brest, working "DG," at 0643 (Lacroix-France).
5755.0	VWV-BOM, Wiluna, FAX weather map at 1355 (Waters-Australia).
5760.1	NCS209-National Communications System auxiliary station, ALE sounding at 2152 (Metcalfe-KY).

5773.0	"The English Man"-Russian Intelligence, callup "147 147 147 1 37673" and message (E07), earlier on 7473, at 2042 (PPA-Netherlands).	8912.0	P16-COTHEN at USCG Air Station Miami, FL, working L07 (USCG MH-65C #6607), ALE at 2322 (ALF-Germany).
5800.0	"Cut Number Station"-Cuban MCW callup and 5-letter-group messages (M08a), in progress at 0600 (PPA-Netherlands).	8930.0	C-GTSH-Air Transat 194, an A310, company LDOC medical patch in English and French, at 0714 (Lacroix-France).
5810.0	M08a-CW in progress, at 0602 (Boender-Netherlands).	8951.0	Tashkent Radio, Uzbekistan, working unknown "Uzbek" flight in Russian, at 0044 (ALF-Germany).
5815.0	"Strich"-Unknown intelligence, German callup "V99/00" (G11), then "Ende" after null message, at 1307 (ALF-Germany).	8957.0	"13"-Santa Cruz HF DL, Bolivia, uplink to N205UW (US Airways B757), at 0510 (PPA-Netherlands).
5855.0	G11-German null-message callup "V75/00" and "Ende," at 0938 (ALF-Germany).	8977.0	"03"-Reykjavik HF DL, Iceland, uplink to VP-BWH, an A320, Aeroflot 117, at 0947 (PPA-Netherlands).
5883.0	Unid-Cuban Spanish AM female (V02a), 5-number groups in progress at 0704 (Boender-Netherlands).	8992.0	Reach 637-USAF, weather from Puerto Rico HF-GCS, at 0240 (ALF-Germany).
5898.0	M08a-MCW groups in progress at 0505 (PPA-Netherlands).	9025.0	SUN2-Unknown US military, ALE sounding at 1530 and 1924 (ALF-Germany).
5901.0	USDAHQ1-US Department of Agriculture headquarters, DC, ALE sounding at 1647 (Metcalfe-KY).		Bandsaw Lima-USAF E-3 AWACS back end, ALE autopatch (as E3002) via OFF (Offutt AFB, NE), then voice with (sounded like) Workshop at 1634 (Metcalfe-KY).
6312.0	003669995-USCG, Portsmouth, VA, DSC safety test at 0511. 003669991-USCG, Boston, MA, DSC safety test at 0518 (PPA-Netherlands).	9067.7	Unid-Egyptian MFA, Cairo, selcalling OOVF, Pyongyang, North Korea, also on 18451.7, SITOR-A at 2053 (PPA-Netherlands).
6474.0	KSM-MRHS, CA, simulkeyed CW with KPH, also on 8438.3, at 0630 (Waters-Australia).	9255.2	PWBR-Brazil Naval Patrol vessel Bracui, working PWB33, Belém, SITOR-B at 0422 (ALF-Germany).
6477.5	KPH-MRHS, CA, simulkeyed on 8642, 12808.5, and 17016.8; CW bulletins at 0630 (Waters-Australia).	10057.0	San Francisco-Pacific oceanic air control, position and selcal check from Hawaiian Airlines 30, gave 6673 secondary, at 0330 (Prez-MD).
6507.0	VMC-BOM, Charleville, voice synthesized "male" with South Australia forecasts, at 0210 (Prez-MD).	10087.0	VP-BIG-AirBridge Cargo Airlines B747, flight ABW540, HF DL position for Krasnoyarsk, Russia, at 1938 (MPJ-UK).
6565.0	"02"-Molokai HF DL, HI, uplinks and squitters at 0825 (Waters-Australia).	10242.0	N04-USCG HC-144A #2304, ALE sounding, also on 14582, at 1340 (MDMonitor-MD).
6622.0	Madang-Papua New Guinea, position from an Air New Zealand flight, at 0737 (Waters-Australia).	11175.0	Offutt-USAF HF-GCS, NE, sending Ruler 96, MS Air National Guard C-17, to 13200 for a patch, at 1628, Offutt, working Topcat 34, a probable RC-135 surveillance aircraft, regarding status of RC-135 Snoop 55, at 1941 (MDMonitor-MD). Enormity-US military, sent to 11220 for a patch by Andrews (USAF Andrews HF-GCS, NE), at 2318 (Jeff Haverlah-TX).
6661.0	"04"-Riverhead HF DL, NY, uplink to N17126, Continental Airlines B757, at 0309 (PPA-Netherlands).	11205.0	Tascomm, selcal JK-ES to Ascot 6616, UK Royal Air Force C-17A registration Z12171, at 0915 (PPA-Netherlands).
6673.0	San Francisco-Pacific oceanic air control, position from American 162, at 0217 (Prez-MD).	11220.0	Enormity-US military came from 11175 for a patch to Deer Horn via Andrews HF-GCS, at 2319 (Haverlah-TX).
6696.5	HBM46-Swiss Army, SITOR-B "voyez le brick" test loop, also on 6978.5, at 0925 (ALF-Germany).	11232.0	Sentry 50-USAF E-3B AWACS, patch via Trenton Military to Raymond 24, Tinker AFB, OK, at 2047 (MDMonitor-MD).
6739.0	Andrews-USAF HF-GCS control, Andrews AFB, MD, 28-character EAM, parallel on 11175, at 0705 (Waters-Australia).	11256.0	Holloway-Ethiopian airlines company LDOC, Addis Ababa, calling flight 19, at 1719 (PPA-Netherlands).
6765.1	HSW-Bangkok Meteo, Thailand, musical chime and female machine voice at 1826 (PPA-Netherlands).	11300.0	Speedbird 064-British Airways, working Khartoum, Sudan, at 2154 (Lacroix-France).
6767.0	NSFHQ1-US government, possibly National Science Foundation, also on 6780.6, ALE sounding at 1809 (Metcalfe-KY).	11348.0	LY-SKR-Aurela Airlines B757, HF DL position for Las Palmas, Canary Islands, at 1033 (MPJ-UK).
6819.6	KTQ316-Probable US Environmental Protection Agency, ALE sounding at 2037 (Metcalfe-KY).	11485.0	143CDC40-Tulsa Health Department, OK, voice WNG971, ALE text message at 1656 (Metcalfe-KY).
6890.0	VKL-Royal Flying Doctor Service, Western Australia, at 1045. VKJ-RFDS, Western Australia, at 1127 (Waters-Australia).	12219.0	FC1FEM-FEMA Region 1 Communications Manager, calling PR2FEM, PR Emergency Management Agency, at 1400 (MDMonitor-MD).
6910.0	NNNOVHA-US Navy/ Marine Corps MARS, taking check-ins on SHARES Region 6 Net, at 1638 (Metcalfe-KY).	12226.7	Unid-Egyptian embassy, Kampala, Uganda, SITOR-A message to "71," at 1750 (PPA-Netherlands).
6992.5	MFJ04-UK Royal Navy Sea Cadets, working MFM27, MFQ15, and MFM01; at 1940 (ALF-Germany).	12431.0	GWPWN33-Brazilian Navy, Natal, working GWPWIN, also on 17010, ALE at 1252 (MPJ-UK).
7527.0	HSD-USCG Cutter Drummond (WPB-1323, international call sign NHSD), calling Z13, USCG Sector Key West, FL, at 0900 (MDMonitor-MD).	12497.0	4JIF-Russian vessel Reshid Behbudov, selcal KYVX to UAT, Moscow (duplex on 12599.5), SITOR-A auto telex at 1841 (PPA-Netherlands).
7535.0	VMW-BOM, Wiluna, FAX weather chart at 1255 (Waters-Australia).	12552.0	KKUI-Restored Victory Ship American Victory, maritime mobile in FL, "Night of Nights" CW duplex working KPH, at 0100. KKUI, duplex with KSM at 0104, KFS at 0109, and WLO at 0125 (Stegman-CA).
7602.0	3A7D-Chinese military (M89), CW marker calling DKG6, at 1923 and 2033 (MPJ-UK).	12577.0	002241021-Bilbao Radio, Spain, answered DSC call from 538090155 (V7HF5, bulk carrier Brunhilde Salomon), at 0825 (PPA-Netherlands).
7632.0	NMN-USCG Camslant, VA, checking into SHARES Region 4 Net, also WGY9416, FEMA auxiliary mobile, OH, at 1605 (Metcalfe-KY).	12695.5	KFS-MRHS, CA, simulkeying bulletins with KPH, CW at 0630 (Waters-Australia).
7833.0	WOXN-Chinese military (M89), CW marker calling QPZM, at 2147 (MPJ-UK).	12993.0	KSM-MRHS, CA, CW maritime data, simulkeyed on 17026 KFS, at 0542 (Waters-Australia).
8000.5	GS1-US military or government, calling ADW (Andrews AFB, MD), also on 11400.5 and 12000.5, ALE at 1732 (Metcalfe-KY).	13134.0	SVO-Olympia Radio, Greece, voice news in Greek, at 1945 (PPA-Netherlands).
8047.0	I050NN-IN National Guard, Indianapolis, calling EMERGENCY, ALE at 1315 and 1320 (MDMonitor-MD).	13137.0	UDK2-Murmansk Radio, Russia, maritime phone patch at 1703 (PPA-Netherlands).
8131.0	Unid-Stations in Mediterranean Cruisers Net, backup frequency for 8122, at 0556 (PPA-Netherlands).	13179.0	UTQ-Kiev Radio, Ukraine, operator with "radiogramma," at 0723 (PPA-Netherlands).
8156.0	Coral Harbour Base-Royal Bahamas Defence Force, getting status of patrol vessel C6DR, at 1155 (MDMonitor-MD).	13468.0	E07 "English Man," null-message callup "441 000," at 1700 (Mike-West Sussex, UK).
8182.0	Unid-Several Spanish speakers, usual whistle at callup, at 0044 (MDMonitor-MD).	14396.5	AAV4AR-SHARES net control, GA, working WGY 923, PA Emergency Management, at 1650 (MDMonitor-MD).
8187.0	Robert Crown-Unknown military, weather and status check with NA29 Brave, at 2032 (Metcalfe-KY).	14396.5	KHA908-NASA Ames Research Center, CA, checking into national SHARES net, at 1625 (Metcalfe-KY).
8280.0	7P4S-Venezuelan Navy, possibly Training Ship Simon Bolivar, calling 1EW1, Naval Base "Amario," also on 8340, LSB ALE at 0100 (MDMonitor-MD).	14455.0	KHA908-NASA, CA, reminding KHA946 and KHA959 about KHA909 in the NASA Weekly HF Net, at 1647 (Metcalfe-KY).
8414.5	002711000-Istanbul Radio, Turkey, working 271001063, Turkish container ship Jean-Pierre A (TCRF4), DSC at 0546 (PPA-Netherlands).	14650.0	Unid-Egyptian MFA, Cairo, selcalling and working KKKU, Harare, Zimbabwe, SITOR-A at 0739 (PPA-Netherlands).
8416.5	VFF-Canadian Coast Guard, Iqaluit, SITOR-B Navtex for areas XVII and XVIII, at 0330 (ALF-Germany).	15658.0	123CDCS27-MN Department of Health, Saint Paul, raised 010CDCNHQ, US Centers for Disease Control headquarters, then voice as WNG985, at 1603 (Metcalfe-KY).
8502.0	NMG-USCG New Orleans, "Iron Mike" voice with Gulf forecast and tropical storm Bonnie information, at 0415 (Prez-MD).	15867.0	LNT-USCG Camslant, VA, ALE and voice with N08, USCG HC-144A #2308, at 1613 (MDMonitor-MD).
8582.5	KLB-Shipcom, WA, "Night of Nights" CW markers interrupted for a possible call, at 0317 (Stegman-CA).	16011.7	Unid-Egyptian MFA, Cairo, Arabic SITOR-A to unknown embassy, at 0710 (Waters-Australia).
8734.0	SVO-Olympia Radio, Greece, listening on channels 806, 1232, 1640, and 2217, English and Greek, at 0603 (PPA-Netherlands).	16026.7	Unid-Egyptian MFA, Cairo, SITOR-A selcalling OOVF, Pyongyang, then went to 16025 for data modem, at 0530 (Waters-Australia).
8764.0	NMN-USCG Camslant, VA, "Iron Mike" weather at 2200 (Lacroix-France).	16128.5	Unid-North Korean MFA, Pyongyang, encrypted 600/600 ARQ, also on 16246.5 and 19241.5, at 0905 (Waters-Australia).
8800.0	HQ3-Libyan Great Man Made River Authority, Tripoli, calling GHADAMES, ALE at 1856 (PPA-Netherlands).	16907.5	JFA-Japanese Central Fisheries, FAX weather chart at 0450 (Waters-Australia).
8825.0	KEA5-New York Radio, working LAN Ecuador 1733, at 0421 (PPA-Netherlands).	17026.0	KFS-MRHS, CA, CW marker at 0116 (Waters-Australia).
8834.0	"08"-Johannesburg HF DL, RSA, uplink to 9V-SKC, a Singapore Airlines A380, at 1816 (PPA-Netherlands).	17405.0	Unid-Russian maritime information, in Russian SITOR-B, at 0734 (Waters-Australia).
8840.0	"Operaciones"-Unknown company LDOC, Spanish with unknown flight at 0005 (ALF-Germany).	17434.7	Unid-Egyptian MFA, selcalling KKVZ, Kampala, Uganda, SITOR-A at 0810 (Waters-Australia).
8867.0	Auckland-Pacific oceanic air control, New Zealand, working flights along with Sydney, Australia, at 0425 (Prez-MD).	18238.1	ZSJ-South African Navy, Silvermine, FAX surface analysis at 0655 (Waters-Australia).
8879.0	Mumbai, India, selcal check QR-LP with Air Arabia 457, an A320 registration A6-ABR, at 1828 (PPA-Netherlands).	18261.0	GYA-UK Navy, Northwood, FAX weather at 1705 (PPA-Netherlands).
8885.0	PK-GPI-Garuda Indonesia A330, flight GA0089, HF DL log-on with Muharraq, Bahrain, at 2207 (MPJ-UK).	18331.7	Unid-Egyptian MFA, Cairo, SITOR-A messages to unknown embassy, at 0825 (Waters-Australia).
8891.0	Gander-NAT-D, Canada, handing Air India 102 to Shanwick on 2862, at 0141 (Prez-MD).	20890.0	D49-US Customs P-3 registration N149CS, ALE sound at 2054 (MDMonitor-MD).
8894.0	Algiers-African air route control Area 2, "good morning" and position from unid flight at 0147. Brazzaville, Congo Republic, working Lufthansa Cargo 8264, at 0235 (Prez-MD). N'djamena, Chad, working Afrique Air 764, also using 8903, at 1938 (PPA-Netherlands).		



Digital Utility Listening Tips

The idea for this month's column comes from reader Rowland H, who suggested that it was time for an update of the March 2004 article that featured some listening tips for utility listeners.

❖ Where to find utility signals?

One of the main goals of most of the *MT* writing staff is to help our readers find things they are interested in listening to, or to find new signals of interest. Lists of frequencies we publish in this column and elsewhere accomplish that goal, but what if you want to trawl the bands looking for new digital signals from military and commercial users, aid organizations and diplomatic stations? Where do you look?

While there are plenty of digital signals to be had in the standard worldwide allocations for aero and maritime traffic, it's most often outside of these ranges that the more interesting digital signals can be found. Of course, propagation (more about that later) plays a large part in what you'll be hearing on any given time, day and frequency, but here are my favorite, tried and tested tuning ranges for finding digital utility signals:

Daytime

9000 to 9400kHz
10000 to 11500kHz
12100 to 12450kHz
13300 to 13600kHz
13800 to 14000kHz
14350 to 15100kHz
15700 to 16500kHz
17400 to 17500kHz
18000 to 21000kHz
21500 to 26000kHz

Nighttime

4000 to 4200kHz
4400 to 5850kHz
6600 to 7000kHz
7500 to 8400kHz
9000 to 9400kHz
10000 to 11500kHz
12100 to 12450kHz

Of course, don't let these ranges discourage you from looking *inside* the broadcast, maritime and aero allocations! There are many digital utility stations that use this as a tactic to reduce the chances of being overheard, but in the main, because they are often at a significant power and antenna disadvantage to broadcasters in particular, the kinds of digital utility signals we are interested in will usually be in the ranges listed above.

❖ How to Find Utility Signals

Most of my time at the radio is spent manually tuning through the ranges I've indicated above hunting for new signals and logging regularly heard stations to ensure that I don't miss any changes. If you have a traditional radio,

that's about as complicated as it gets. However, the advent of new SDR (Software Defined Receiver) radios that work in conjunction with your computer, like the Perseus from Microtelecom or the IQ from RFSpace, have revolutionized this aspect of listening.

Now, you can park your SDR on a chosen part of the spectrum for however long you want, and these receivers will record a large swathe of bandwidth (usually around 200kHz) at incredible levels of detail. You can simply "play back" the recording at a later time and see all of the activity in that portion of bandwidth at the same time. It really is quite amazing. Hunting for very brief signals that would simply be missed by the traditional tuning of a dial becomes an absolute breeze.

❖ Identifying Unknown Stations and Signals

Now that you know where to tune and what to record, the next most important question to answer in most cases, is "What and/or who have I just heard?" Fortunately, these days, there are plenty of resources (besides this very publication, of course!) to help you discover the identity of your latest catch:

- a traditional print or CD-based frequency list like *Klingenfuss* or *Siebel*
- custom-designed utility databases like *PC Frequency Manager*
- other peoples' logs from the *UDXF* mailing list
- Leif Dehio's digital signals audio clips archive
- the *ITU Monitoring Service's* frequency lists

In my case, I regularly download the files from the *ITU Monitoring Service* and convert them from Excel spreadsheets or DBF database files into a format that I can load into my *Bento* database. I have about 120,000 *ITU*-listed signals that I can search at the click of a button in this way.

To make just about everything else searchable, I use a Mac program called *EagleFiler*. This is a very flexible, free-format document database into which you can load PDF files, text files, emails and virtually any other kind of document. *EagleFiler's* job is simply to index all of the text and make it searchable. In this way, I have several tens of thousands of *UDXF* (and its predecessor *WUN*) emails, a decade's worth of *Monitoring Times* issues, and several other resources all at my fingertips. Most of the time, I'm just typing a frequency like "11430" into *EagleFiler* and looking at the results to see if my latest catch matches anything previously heard.

❖ Logging Digital Utility Signals

Now that you know where and how to find them, you'll need to keep a record of the stations you hear. As long-time readers of this column will know, the operating habits of many organizations stay the same while they may go through generations of equipment, so keeping track of as much information as possible about what you hear is important.

You can use a simple written logbook, a text document on a computer, a spreadsheet program like Microsoft Excel or Apple's Numbers, or a simple database program like Microsoft's Access or Filemaker's Bento. There are even purpose-designed logbook programs that come with many of today's radio control programs like Bonito's RadioCom.

Whatever you use to record it, at the very least, your logbook will need to note the following items of information:

- Date First Heard
- Time First Heard (in Universal Coordinated Time)
- Date Last Heard
- Time Last Heard (in Universal Coordinated Time)
- Frequency
- Callsign or Identifier Used
- User
- Location
- System Details (speed, shift, mode, encryption used, identifying features, etc)

After many years of using Appleworks on a Mac, I now use Filemaker's Bento database to keep my logbook of 15,000+ digital stations I've heard since 1996. This makes adding, updating, sorting and searching so much more convenient than paper.

❖ Propagation Tools

As I mentioned earlier, a lot of what you can hear at any given time and day will depend largely on the activity of the Sun. Knowing the solar conditions at any time can help you tailor your listening to frequencies and locations that are most likely to be heard. Think of it as a weather forecast for your shortwave radio.

Propagation analysis tools are also useful for trying to place new and unknown stations, because when you can hear them – and sometimes more importantly, when you can't hear them – will help indicate a station's approximate location.

Again, there is a wealth of resources to help you gauge the current and future listening conditions:

continued on page 31



October is Full of Fun

Every month is a great month to be an amateur radio operator. However, for me at least, October is always one of my favorites. The static crashes of summer are abating. The nights are getting longer. HF propagation picks up and VHF is still going strong. October is a month for just relaxing and enjoying the greatest hobby in the world.

❖ Work While the Weather is on Your Side

With the heat of summer behind us and the winds of winter still a few weeks away, now is the time to get out and give the antennas a good going over. Break out the safety gear and get up and give all your wire and cables a visual inspection.

If your feedline is more than a few years old, especially if it is coaxial cable, this would be a good time to replace it. If you have traps on your antennas, it is a good idea to check their integrity. All too often, critters crawl in the traps and build their nests. Also, they are subject to holding moisture if the drain holes get plugged by those aforementioned critters.

Check to make sure all your connections and connectors are well sealed and really give your outside ground system a good look. You may be moving outside of the thunderstorm season, but you can still get lightning during snow storms.

In taking the time to check out your antennas, also give a thought to any antenna support structures you have in place. One year I checked out one of my dipoles and found that the tree to which one side was attached had sustained a serious crack in a large branch right above the wire. Clearing that away assured that it wouldn't come down in the middle of winter when fixing the antenna might be both cold and dangerous to do.

Remember Old Uncle Skip's maxim: "Wire is cheap!" While you are out there looking over your existing skywires, why not give a thought to trying something new this season? Break out the *ARRL Antenna Handbook* or check out one of the Web sites devoted to antenna design. If your log book is weak in a particular direction, maybe try to string up a gain antenna such as a Half Square to try to pull in a few new DX entities over the winter season.

❖ Work Inside, Too

If you have followed this column for any length of time, you know I am a bit obsessive when it comes to preventative maintenance on my radio gear. At least once a year, I take my primary transceivers down to the work bench to clean them

up and realign things to peak performance.

If you don't feel the need to make such a serious commitment, no worries. At least give your equipment a good visual going over, maybe blow out any accumulated dust and dirt to assure clean air exchange around heat sensitive components.

One of the most common failure points in shacks seems to be the feedline connector that goes into the back of the rig. These connectors and cables often get bent at odd angles, causing intermittent contact problems. Another thing that happens is oxidation on the solder joints of the connection. The symptom that indicates this is a low volume on receive that picks up after you transmit. A quick touch with an iron to re-flow the solder on the connector, along with a swipe of sandpaper or emery cloth usually does the trick on this gremlin.

❖ Mobile Readiness, Too

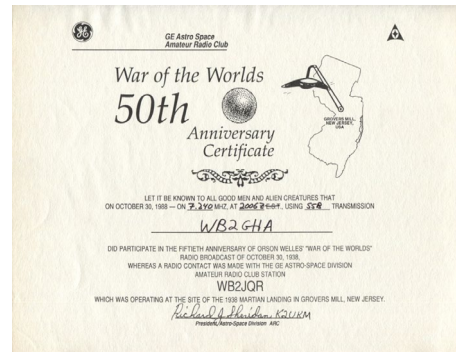
I think we can all get a bit neglectful of our mobile rigs. Yet they are most susceptible to failure, especially due to wear and tear. When we make mobile installations of power and antenna cabling, we are, to some degree, subverting the efforts of the entire engineering and design team of the auto manufacturer.

While you're making your checks of everything ham radio this October, you might want to sight along your radio wire runs in your car or truck to check for abrasions brought on by the vibrations and movement caused in any vehicle. Again, it's easier to crawl around your car in this temperate time of year than needing to trace a wire problem in the dead of winter.

❖ Get Ready for Competition

The big fall and winter contests are right around the corner starting with the CQ Worldwide DX Contest (Phone) on October 30th. Even if you are a casual operator, diving into the contests is a great way to fill up the log book. October has a lot of fun contest experiences that can get you ready for the bigger events coming up in a few weeks.

One way to get geared up for the contest season is via the State QSO Parties. October has no less than six QSO Parties usually held during the month. These include activities for Arizona, California, Illinois, Iowa, New York, and Pennsylvania. If you are looking to work toward the coveted 5 Band Worked All States award (5BWAS), these parties are the way to go. If you are a County Hunter, they also offer a way



to fill in the gaps in your log for the Worked All Counties awards.

My close friend Jon WB2KKS clued me in to a fun way to play the State QSO Party game. This works best with the closer states, but can be a fun challenge regardless. Take a map of the state that indicates all of the counties. As you work each county, check it off on the map. Try to get them all, but don't feel bad if you miss a few; this is supposed to be fun, remember? Jon has been doing this for years with the PA QSO Party and it's become a point of pride to say "I've got them all!"

Another fun contest in October is the 10-10 International Club's "10-10 Day Sprint" held on (you guessed it) October 10th. Ten meters is starting to come back nicely and this contest is a great way to dip your toe into one of the most interesting bands.

When ten meters is dead, you could throw a kilowatt signal into the air and barely be heard down the block. When it is open, you can load up a light bulb with half a watt and work the world. Okay, those are extreme statements, but say that to any dedicated Ten Meter Op and he or she will nod knowingly. For more information on this event, check out the Club Website at www.ten-ten.org.

Another point on all these above mentioned operating events: If you are primarily a phone operator but want to give CW contesting a try, I find that these events are a bit more forgiving to slower CW ops than the Big Gun contests. Since the competition is a bit less intense, it is much easier to find some folks that are willing to slow down (QRS) to swap points with you.

And, while we are on the subject, don't forget the F.I.S.T.S Fall Sprint on October 9th this year: www.fists.org/

❖ Special Events

Special Events Stations are available on most weekends of the year, but for some reason, I always seem to gravitate to Special Events opera-

tions during the month of October.

For those of you new to amateur radio, a Special Events station is usually set up by a group of folks to commemorate a (...wait for it...) Special Event. This could be a ham club's anniversary, a local historical event, a community activity, just about anything you can imagine. Folks put up a station for the event, sometimes getting a unique callsign for the commemoration.

Once you work the station, they will usually share, over the air or through a ham radio magazine such as *QST*, the address and procedures for QSLing. Usually this will involve sending a stamped self addressed envelope (SASE) along with your QSL card. In return, you often get a nice certificate to display for your efforts.

Two of my most memorable Special Events QSOs occurred during the month of October. The first of these was when I still held the callsign WB2GHA.

October 30, 1938 was the date of the famous Mercury Theater on the Air broadcast of the radio play *War of the Worlds*, directed and narrated by Orson Welles. This radio play became known as "The Panic Broadcast" because its news bulletin format made folks think that Earth was, in fact, being invaded by strange creatures from Mars. If you recall the plot of the show, the alien space craft supposedly landed in Grover's Mills, New Jersey.

On the 50th anniversary of the broadcast, a group of hams from The GE Astro Space Amateur Radio Club WB2JQR went to a public park in Grover's Mills and set up a Special Event operation to commemorate the historic broadcast.

Collecting this Special Events certificate was only part of getting into the spirit of that evening. I also listened to a rebroadcast of the original Mercury Theater show from nearby CBS affiliate WCAU 1210 (now WPHT). To make things even more fun, I listened in on a restored 1938 Westinghouse table radio. The framed Special Events certificate hangs over that radio in my office to this day.

My second October Special Event catch of note occurred during 1999. That was a great year for QRP enthusiast in the radio hobby. It was the year that Ed Hare W1RFI discovered and restored the late great Doug DeMaw W1FB's original Tuna Tin II Transmitter. Designed and built in 1976 and lost for some time, having that little rig back on the air was a big deal for the QRP community and for any fan of Doug's great body of work.

On October 30, 1999 I worked Ed, operating as W1AW/QRP from the American Radio Relay League Headquarters, using Doug's rig. Good enough for some, but my contact was a TWO WAY Tuna Tin II contact. I was sending to Ed with my own TT2.

This was a great thrill, having the chance to work Doug's original transmitter. It was topped in March 2000, however, when I got to operate using the original TT2 at the Atlanticon QRP Convention. But that is another story entirely.

I hope these two stories inspire you to poke around on the bands in October in search of your own Special Event memories.

❖ Plan for Winter Solder Melting

When the hard winter drives me in from outdoors (quite a trick, as I have a dry suit for kayaking), I can always be found snug in my basement workshop building something or other. With the dozens of kits and hundreds of schematics out on the Web, there is always something to construct. Transmitters, receivers, transceivers and all manner of radio hobby accessories are a few mouse clicks and a few dollars away.

October is the month I usually begin my parts search and my kit buying so that my workbench will be full of fun and adventure all winter long. There is no greater point of pride than letting the ham on the other end of the QSO know that you are running something home brewed.

If you are new to building your own equipment, don't bite off more than you can chew. Start with something simple like a code practice oscillator or even the above mentioned Tuna Tin II (currently available from QRPme, PO Box 160, Limerick, Maine 04048, <http://qrpme.com>. Rex Harper W1REX runs a great little kit operation with lots of simple fun things to build. His Web site is well worth a visit.

❖ QRP Legacy

You no doubt read that the hobby lost one of its great writers in January of this year. Dave Ingram K4TWJ (SK) authored over 25 books and thousands of article on amateur radio, most recently as a columnist of *CQ* magazine. He was a giant in the hobby, and he will be missed now that he

has gone "Silent Key."

As my brief ham radio book review this month, I'd like to share my thoughts on Dave's final work, which was a self-published book.

QRP ROMPS

by Dave Ingram K4TWJ
88 Pages, \$18.00
Order No. 0160 from
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/shop 1-888-277-5289

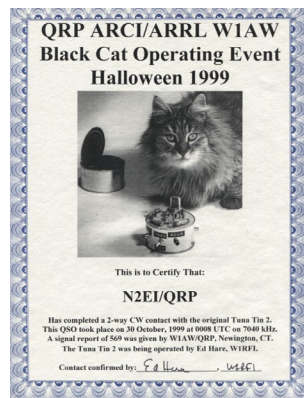
Dave always showed enormous enthusiasm for amateur radio in general and QRP operating in particular. This book – his last word on the subject – covers all aspects of the current state of the art of low power ham radio.

Ingram begins with a general explanation of QRP and how it is possible to work the world with such low power levels. He goes on to discuss operating strategies to let a low power operator compete with the Big Guns on the air. He devotes an entire chapter to QRP clubs and QRP specific contests.

The book gives a complete guide to currently available commercial equipment and the many great kit rigs and accessories that are available to the QRP op. Dave finishes out with a chapter on antennas designed to allow a low power station to put up the most efficient skywire possible.

As you can see from my comments on *QRP Romps*, it is hard to talk about Dave's work in the past tense. Dave may be gone, but his body of work, including this book, remain with us.

Well, enjoy the month of October. Enjoy ham radio every month of the year. You'll always find me at the bottom end of 40 meters, no matter what page the calendar is turned to. Have fun!



NOW AVAILABLE

Radio hobbyists interested in receiving and identifying radio stations in the HF/VHF/UHF radio spectrums now have a new whopping 1414 page CD-ROM publication to aid them.

International Callsign Handbook is a concise world directory of various types of radio station identifications covering the military, government, maritime, aeronautical, and fixed radio stations on CD-ROM. Thousands of callsigns and other types of identifiers have been collected from our own personal log book, official sources and dedicated hobbyists who contributed their material.

World QSL Book - Radio hobbyists interested in receiving verifications from radio station now have a new CD-ROM publication to aid them in the art of QSLing. This 528-page eBook covers every aspect of collecting QSL cards and other acknowledgments from stations heard in the HF spectrum.

"I'm impressed. This is a comprehensive collection of worldwide radio identifiers likely (and even some less likely) to be heard on the air. Over the years the Van Horns have earned the well-deserved respect of the monitoring community. Accurately assembling a collection like this is a mammoth undertaking. Congratulations on a job well done."
Bob Grove - December 2008 What's New Column, Monitoring Times magazine

Both books may be ordered directly from Teak Publishing via email at teakpub@brmemc.net or via our two main dealers, Grove Enterprises, www.grove-ent.com, and Universal Radio, www.universal-radio.com.

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GETTING STARTED

THE BEGINNER'S CORNER

Ken Reitz, KS4ZR

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Buying Your First Shortwave Radio

The first shortwave radio that I bought was in 1966 and it was a Knight-Kit Star Roamer from Allied Radio, whose catalog, along with Lafayette's, were as required reading for shortwave listeners as *Popular Electronics*. I think it cost about \$30 and took weeks to put together, working every afternoon after school with my good friend Jack Hogan.

It was a nice entry-level shortwave radio, though to me, it was as good as anything Hammarlund or Hallicrafters ever made. Today, entry-level shortwave radios would run rings, at light speed, around the Star Roamer.

There's understandably a lot of warm nostalgia for the old tube-fired receivers, but who would give up the total portability, low power consumption, direct frequency tuning, and amazing sensitivity of today's portable shortwave radios? There's no doubt in my mind that we are living in the golden age of shortwave radio manufacturing right now. With surface mount reliability, digital signal processing, and more memory capability than early computers, radios have never been better made. The best part is that, unlike the old days, there are competent shortwave radios at just about every price point.

❖ What Not to Buy

There have always been junk radios on the market, and for some reason otherwise intelligent people are lured into buying them. Internet "auction" sites are full of them and people are often drawn to these radios because they seem to offer sensible features. The funny thing is that these junk radios don't cost that much less than ones that really work. They represent very little in actual savings.

Over the years I've heard from readers who have complained that there just wasn't much to listen to on shortwave, other than preachers or incomprehensible foreign languages. I have to tell them, it's not HF, it's your radio.

There's also a batch of cheap, look-alike "emergency" radios that, at first glance, have tons of "useful" features, including built-in flashlights, red strobe



Radio Shack multi-tasking portable shortwave receiver. For \$40 it will perform as advertised, but you'll be disappointed at its shortwave reception capabilities. (Courtesy: Radio Shack)

lights, sirens, hand-crank driven power generators, solar power cells, and jacks for charging cell phones. I've even reviewed these radios in the pages of this magazine. They work as advertised. But, don't confuse these radios with serious shortwave receivers. Most use stiff analog tuners with miniscule band spread capability; have miniature whip antennas, and are easily overloaded by any nearby transmission source. Give them a pass.

Junk shops, antique stores, flea markets and eBay are all teeming with an endless supply of used junk radios. If it was a junk radio new in the box, why would you buy it now, just because it costs less? Now, of course, there are exceptions. If you read Michael Jacks cover story in the December issue of *MT* "The Big World of Little Radios," you'll know that there are some superb, older, solid state radios that are not only great radios still, but collector's items worth many times what they were new. Maybe you'll get lucky and find one in a junk shop and buy it cheaply. But, you'll have to look at a lot of trash to get to it.

Vintage, tube-fired shortwave sets such as those featured in Lin Robertson's cover story for the July issue of *MT*, "Restoring Vintage Broadcast and Shortwave Sets," also look attractive to first-time shortwave radio buyers. Why not get a great old, warm and fuzzy Zenith and take up pipe smoking this winter? Because, these radios make terrible choices for beginners. If you're not prepared to dive into these sets and painstakingly restore them the way that Lin or Marc Ellis, our *Radio Restorations* columnist does, then you're in for a disappointment the first time you turn on the set and it starts smoking.

There's an undeniable attraction to sitting down to a \$2,500 shortwave receiver hooked up to a massive outdoor antenna. But, even if you have the money, this is not the place to start, either. If you've never spent any time tuning around the HF spectrum, you may quickly have buyer's remorse, particularly given current band conditions. The worst part is that you'll wait a long time before you find a buyer who will give you anywhere near the price you paid.

❖ OK, What Do I Buy?

Before you buy your first shortwave radio, let's consider what you really need. If you want an inexpensive, all-around, all-band, portable shortwave radio, start with something like the Kaito KA1103. It's been a perennial favorite with a number of *MT* reviewers throughout the last several years, and with good reason: It's



Kaito 1103 is one of many quality portable shortwave radios available for less than \$100. (Courtesy: Kaito U.S.A.)

versatile, easy to use and you won't be out much if the HF bug doesn't bite you.

If portability isn't an issue and you've got more money in the budget, think about stepping up to something more expensive and capable, such as the Eton 750 (\$300 at Grove Enterprises). They've got

a good track record and the reviews are very positive. You'll get better reception and certainly better audio out of this radio than any portable.



Eton 750 shortwave radio (\$300 from Grove Enterprises) is a capable bridge between the \$100 radios and the \$700 rigs. (Courtesy: Eton)

If computers are your second love, consider investing in a software defined radio (SDR) such as the WiNRADiO or Flex Radio series. And, if you're handy with a soldering iron, you might consider DZKit's Sienna, all-band, SDR (www.dzkit.com/detailed_information.htm). You can forget the computer with this radio; it's got one built in!



WiNRADiO's Excalibur software defined radio at \$850, is a feature-packed software defined radio. (Courtesy: WiNRADiO)

You'll get twice the radio by combining "black box" receivers such as the WiNRADiO or Flex Radios with your computer. And, by adding free software, you'll get DRM (digital



MFJ-784B DSP audio filter (\$250) cleans up adjacent channel interference, tones and other problems on the frequency. It's a way to update older radios without such features. (Courtesy: Universal Radio)

shortwave broadcasts) thrown in the bargain! You can't get that with any analog radio. SDR's are more expensive, \$850-1,500, but extremely capable receivers.

Once you figure out your budget and what you think you'd like to buy, take some time to read the reviews in previous issues of *MT*. They're all neatly lined up for you on the *MT* home page. Just click on the button that says "MT Reviews." Next, click on "All Reviews" to see an index of reviews from 1997 to 2007. Click on the hotlink "Shortwave Receivers." An article index through July 2010 is also available on the home page that might give you more updated reviews. You can also use this list to check out used sets you might find online or in flea markets. We've done all the testing and tuning for you; now you make the choice.

You can also benefit from learning what radio enthusiasts from around the world have to say about the product you're interested in. Check out the reviews at www.cham.net. But, keep in mind that some reviews are colored by personal prejudices or lack of competency. Anyone can post a review. Still, you'll recognize a reviewer who's knowledgeable.

Consider giving your radio some help. There are accessories that you can buy that may enhance your shortwave listening. One is an outboard digital signal processor (DSP - See *Computers & Radio for more on DSP-ed.*). This is one way to remove adjacent channel interference or squeals or hum on a frequency you're trying to listen to, particularly on an older receiver that doesn't have such a feature. The MFJ model pictured here is a knob twister's dream with no fewer than 14 buttons and knobs you can use to peak and tweak those elusive signals. It's a good thing to have if you're a serious listener, and at \$250 you won't break the bank adding it to your signal arsenal.

❖ Final Thoughts

Here are some final things to consider when buying your first shortwave radio. We are still wallowing in the depths of the singularly worst solar cycle anyone can remember. No radio, regardless of cost or capability can drag signals out of the air that don't exist.

Every radio benefits from a better antenna. Expecting to pull weak signals out of a shaky ionosphere with an 18" whip antenna is asking for disappointment. If you can't put up an outside antenna, you're limiting the listening potential of your radio shack.

And, finally, if you live in an electrically noisy environment, you may have to take extraordinary steps to solve that issue. Some places are simply impossible. Consider moving.



Icom R75 is a great traditional desk-top shortwave receiver priced at \$700 but can be found at Universal Radio for \$620. (Courtesy: Universal Radio)

One other thing to consider is "growing" into your shortwave hobby. If you've been reading Hugh Stegman and Chris Parris' columns regularly, you'll know that there's a lot out there to tune in. If you've got the bucks, jump right in with the Icom R75; you won't regret it. If you're not sure, go the Kaito 1103 route and work your way up. If you're still interested a year from now, you'll know what to look for.

Since the purchase of the Star Roamer decades ago, I've bought a number of shortwave radios. The best portable was a Uniden 2021cr (from Grove Enterprises in 1982). I paid \$189 for it new. It was easily twice the radio the Star Roamer was and it has seen daily service the last 28 years and still works great. The last shortwave radio that I bought was the Kenwood TS-140s transceiver I bought new in 1988. It has been such a great general coverage shortwave receiver that I've never considered buying another.

If you've just upgraded your ham license to General Class, this is the time to consider getting a good transceiver. Older, reliable rigs from Kenwood, Icom and Yaesu are relatively cheap. You'll be able to talk to the world and tune in the world, all on the same radio. If you buy a good enough radio to begin with, you may never have to buy another.



Uniden 2021cr was Uniden's answer to the Sony 2010 and at about half the price, it performed nearly as well; this preowned model still makes a good first shortwave receiver. (Courtesy: Universal Radio)

Digital Digest continued from page 27

custom-designed propagation programs like VOACap, ACE HF Pro and DXToolBox websites like HFRadio.org and QSL.net's Propagation Page

I use BlackCat Systems' DXToolbox, which is a simple but powerful program that reads the current conditions at regular intervals from NASA servers and allows me to see the expected best frequencies and times for many different locations around the world. DXToolbox works on Windows and Mac operating systems.

Finally, I also like to join the other listeners on Internet Relay Chat channel #wunclub, where there is always a lively exchange of live digital utility frequencies being tracked down by listeners around the world. Give it a try!

Until next time, enjoy your digital listening and do please keep your emails and letters coming with suggestions for what you want to see in the column.

RESOURCES

Radiocom : www.bonito.net
Klingenfuss: www.klingenfuss.org
Digital Signals Audio Archive: www.signals.taunus.de
Siebel Verlag: www.radiobookshop.de
PC Frequency Manager: www.frequencymanager.de
UDXF: <http://groups.yahoo.com/group/UDXF>
ITU Monitoring: www.itu.int/ITU-R
EagleFiler: <http://c-command.com/eaglefiler>
DXToolBox: www.blackcatsystems.com

PERSEUS SDR Direct Sampling HF-Receiver



The **Microtelecom Perseus** is a cutting-edge, multimode, software defined receiver covering 10 kHz to 30 MHz. Enjoy world class performance: 3rd order IP: +31 dBm, Sensitivity: -131 dBm, Dynamic Range: 104 dB (BW 500 Hz CW). An impressive full span lab-grade spectrum display function is featured. An almost magical spectrum record feature allows you to record up to an 800 kHz portion of radio spectrum for later tuning and decoding. The audio source is via your PC soundcard. The Perseus operates from 5 VDC and comes with an international AC power supply, AC plug converter, SO239 to BNC RF adapter, USB cable and CD with software and detailed manual. Made in Italy. Visit www.universal-radio.com for details!



Universal Radio
6830 Americana Pkwy.
Reynoldsburg, OH 43068
♦ Orders: 800 431-3939
♦ Info: 614 866-4267
www.universal-radio.com



PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

Fred Waterer

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So Long to Sweden on SW

We open this month with a reminder to listeners that Sweden bids farewell to the international radio bands at the end of the month. As the **Radio Sweden International** website announces: "This means that from October 31, **Radio Sweden's** programming in English will be broadcast nationally (on FM), as well as available on the Internet, and our podcast will be available here and on iTunes for downloading."

Your editor has been downloading the podcast for some time already. Sweden is the last state broadcaster of the Nordic countries to leave shortwave, joining a trend around the world.

In May 2009, we shone the *Programming Spotlight* on the Nordic countries, including Sweden. Some highlights from that report follow.

"**Radio Sweden** offers a daily email with the next day's program highlights. Here in North America, your best bet to hear Radio Sweden is at 0130-0200 and 0230-0300 via the Sackville, New Brunswick transmitters of Radio Canada International on 6010 kHz."

(Radio Sweden was heard for many years via the CBC Overnight programming block on the CBC Radio One network; however, in recent months much of the international programming has been dropped in favor of BBC and CBC programming during this block.)

"Radio Sweden programs are available online via the Radio Sweden website. In fact there is a 30-day archive of programs. Check www.sr.se/rs/english/. These programs can also be downloaded as a podcast via iTunes or your favorite podcatching program. And it can be heard through the World Radio Network via satellite and online.

"Monday to Thursday, one can hear "**Radio Sweden daily edition**." According to the website "Radio Sweden is committed to its goal of being the best source of information about Sweden in English with relevant, interesting and thought-provoking programmes for Sweden's culturally diverse society, its expatriate community, Swedes abroad and *Swedophiles* around the world."

"Each day, the listener gets a jam-packed half-hour program, looking at all things Swedish. It would probably be nice if they picked up the slack with news of their neighboring Nordic

countries, not that they are required to make up for cutbacks abroad.

"A careful listen reveals a surprisingly multicultural nation: Surprising, because I had no idea of the extent that Sweden is a major destination for immigrants and refugees in Europe.

"Expanding on this theme, on Fridays, Radio Sweden presents **Inside Sweden** 'carried on the national P2 network Fridays at 13:30 hrs local times as well as on shortwave, (which) connects Sweden to the world and new immigrants to Sweden.

"**Radio Sweden Weekend** is a review of the week. 'Each Saturday and Sunday we bring you a round-up of the week's main stories and talk to the people who shaped them – from government ministers to the Swede in the street. What's happening in this country's social, cultural, political and entertainment scenes? If you missed a programme during the week – catch up with Radio Sweden on Saturday or Sunday!' "www.sr.se/rs/english/index.htm



❖ Hallowe'en

All Hallow's Eve occurs each year on October 31. While **Radio Sweden** leaving the shortwaves on that day is neither a trick nor a treat, almost every year at this time, on the 30th or the 31st, some radio station somewhere will play Orson Welles' original recording of *War of the Worlds*, or Jeff Wayne's *War of the Worlds* concept album from 1978, featuring the awesome narration of Sir Richard Burton and vocals by the Moody Blues' Justin Hayward (for trivia fans, the song *Forever Autumn* was a Top Ten hit in 1978). For many years, the late Chris "Punch" Andrews would run these on **Mix 99.9** in Toronto. On October 31 he would morph into "Punchkin Andrews". Great radio!

If you can't find a radio station airing Orson Welles' original famous broadcast, it can be found online via a number of sources, for listening and/or download. The Mercury Theatre On the Air website is one. Just scroll down to October 30, 1938. www.mercurytheatre.info/ Another source is www.archive.org/details/OrsonWellesMrBruns. **Archive.org** has also posted (as this is typed) a copy of the Jeff Wayne version; however, it seems to me this is copyrighted.

Another person who really gets into the Hallowe'en spirit, so to speak, is Michael

Godin of **Treasure Island Oldies**. It's surprising to realize just how many "spooky" and Hallowe'en novelty songs there are out there. Michael, who hosts a 4-hour show every Sunday, presents his annual "**Hallowe'en Spooktacular**" as "**Count Michael**." This year Sunday is right on October 31. Your editor has been a regular listener for over seven years; it's always a fun time. www.treasureislandoldies.com



And what would Hallowe'en be without **Coast to Coast AM aka The Art Bell Show**? Host **George Noory** continues the weirdness established by **Art Bell** on any number of radio stations in the overnight hour. If you can't find a station carrying **Coast to Coast AM**, you don't have your radio turned on! Before I became a reformed night crawler, I used to spend hours listening to the weird, the wacky and the downright fascinating, every night on **Coast to Coast AM**. Traditionally, on Hallowe'en, Art, and perhaps now George, often gave over the whole program to tales of a spooky nature, going so far as to rename the show **Ghost to Ghost**!

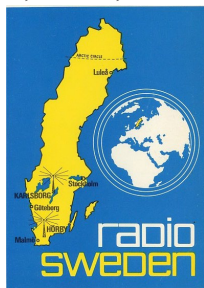
These Hallowe'en stories are always good fun, and often provoke a giggle or two, or perhaps even a shiver! Just remember to bring some grains of salt and apply liberally!



❖ Thanksgiving, Canadian Style

Canadian Thanksgiving Day is October 11. In Canada Thanksgiving is celebrated much earlier than in the United States, probably a function of a much shorter growing season in most of the country. Michael Godin hosts his annual Canadian Thanksgiving Day special on Sunday, October 10. Be ready to hear such songs as Mashed Potato Time and Turkey Trot.

For those readers with access to CBC



Radio One over the air (or online at www.cbc.ca/local), one can hear special holiday programming from Canada throughout the day as regular programming is often replaced by specials or repeats of past programming. Roy Forbes may appear in one of his **Snap, Crackle and Pop** specials early in the morning, but I am not holding my breath. Other stations such as **CFRB/CFRX** may have “Best of” programming.

❖ Recommended Fall Programs

While discussing **CBC Radio One**, the fall schedule is due out as I type this column. A few programs to watch out for in the coming months include:

As It Happens – the flagship interview program on **CBC Radio One** since the 1970s. This summer, **CBC Radio One** has been running an edited version of the program at local midnights across the country, giving one a second daily opportunity to hear the program.

White Coat, Black Art - hosted by Dr. Brian Goldman started as a 10-week summer replacement show in 2007. It proved so popular that it returns frequently to the **CBC Radio** schedule. “Brian has a proven knack for making sense of medical bafflegab. On ‘White Coat, Black Art’, he takes listeners past medical bluff and bluster and shows what really goes on at hospitals and clinics.” This is one of the best and most informative programs on Canadian radio. As of August, the website tells us that the program will “return soon.” Look for it in the fall schedule, which should be published by the time you read this. www.cbc.ca/whitecoat/

Afghanistan – When this program first appeared, your editor was quite skeptical about it, figuring there must be an agenda behind it. Instead, I find it a compelling drama about the experiences of a group of Canadian soldiers in Afghanistan, a country where Canadians have been serving since 2001. “**Afghanistan** gives us a grunts-eye perspective of the war in Afghanistan. 3 -1 Bravo is a Canadian Forces light infantry section, fighting with NATO forces deep in the heart of the conflict. Every day, Sgt. Pat Kinsella (Jenny Young), Private Dean Donaldson (Paul Fauteux) and Private Lucas Manson (Billy Maclellan), confront the chaos and violence of life ‘outside the wire.’ (CBC **Afghanistan** website). It’s not your typical war drama. It comes and goes throughout the year.

Past episodes are available...for a price. Perhaps this is the wave of the future. A link from the CBC **Afghanistan** site takes you to the iTunes store where one can purchase individual episodes for two rapidly depreciating Canadian dollars. (Unless iTunes works strictly in US Dollars, which would be kind of ironic.) www.cbc.ca/afghanistan/

The Age of Persuasion – Hosted by Terry O’Reilly, the program looks into the cool, interesting and sometimes wacky

world of advertising. It’s one of the more fascinating programs I have ever heard on the **CBC Radio One** network. According to the website, it is due to return in January 2011 (so mark your calendars!). In the meantime, while they do not podcast, you can listen to almost every past episode of the program online. www.cbc.ca/ageofpersuasion/archives.html Topics covered in the past year or so have included: *Opportunism, Slogans, Negative Advertising, Marketing the Unpleasant* and many many more. From politics to products, he looks at all the ways that advertisers persuade, or attempt to persuade you to buy or do something. From Vince the Slap Chop Guy to Barack Obama, Terry investigates their methods of selling. It really is engaging stuff. www.cbc.ca/ageofpersuasion/

BBC Radio 4 Case Notes – is a “Medical programme exploring a different topic each week, with reports and input from experts” according to the program website. As medical programs go, I find this one to be one of the best. As you are reading this, your editor will be getting ready for gallbladder surgery: Quite by coincidence, in mid-August, the topic was gallbladder surgery. In the short half hour of the program, Dr Mark Porter examined both the causes and treatment of gallstones and their surgical removal. Dr Porter talked to patients and doctors, prior to surgery, sat in on the procedure (even offering something of a play-by-play) and then talked to the same patients and doctors after the procedure, to get their take on the whole thing.

I thought it might be “too much information,” but in actuality it was just right. But when my turn comes I really hope there is not a radio reporter in the room making the surgeon laugh as he extracts my gallbladder. That could be mildly disturbing. Prior to the program, I had a general idea what was to take place, now I know, pretty much specifically, so, yes, the program was a real benefit.

Several weeks worth of **Case Notes** are available online at www.bbc.co.uk/programmes/b006th1n. You can also listen to the current program on Tuesdays and on demand for 7 days via the Radio 4 website at www.bbc.co.uk/radio4 or, you can download the **Medical Matters** podcast via iTunes (free) each week and listen at your leisure.

Russia – Folk Box is one of the few programs that are holdovers from the Soviet Era still on the Voice of Russia schedule. A quick look at my collection of old Radio Moscow schedules reveals that **Folk Box** was on the schedule as far back as 1985, if not earlier. In my younger days I wouldn’t have bothered with a program like **Folk Box**, but as I have grown older and my tastes have moved beyond what one can hear on Top 40 radio (not that you hear much of that any more, either), it is really enjoyable listening to the music and the ethnic diversity of Russia. One can draw parallels with the “throat singers” of the Rus-



sian Far North and the Inuit of Canada and Greenland. It is also interesting to hear how Russian musical styles and instruments have insinuated themselves into regional cultures, along with influences from abroad. It’s not all balalaikas and male choirs by any stretch of the imagination.

“An indispensable program for lovers of folk music where we take a close look at all peoples inhabiting Russia.” So says the Voice of Russia website, quoting almost word for word, the description of the Soviet era program.

Tune in to **Folk Box** on Monday at 19.30, Tuesday 02.30 and 07.30, 11.30 and 22.30, Wednesday at 03.30, 09.30, 11.30, 16.30 and 21.30, Thursday 02.30, 08.30 and 20.30, Friday 17.30 and Saturday 00.30 and 06.30 and Sunday at 14.30 UTC. Or listen online and on demand at http://english.ruvr.ru/radio_broadcast/2360772/

Svetlana Yekimenko is the host of a number of music programs on **The Voice of Russia**, including the abovementioned **Folk Box, Music and Musicians, Musical Tales, Russia - 1000 Years of Music and Music Calendar**. I really like her knowledgeable, conversational style as she introduces the listener to the wide variety of music covered in her various programs.



Svetlana Yekimenko

Almost every **VoR** program is now available on demand via the website, where you can listen online, or download the program for later listening. Often the programs are archived for several weeks, which is a nice feature if you want to revisit a past program. Sadly, as far as **VoR** music programs go, the two programs that **AREN’T** archived online are the two best ones: **Jazz Show** and **Russian Hits**, hosted by Carl Watts and Emil Akopov respectively.



❖ We get letters...

“Fred, in response to your (recent) article...AFRTS is alive and verifying reception reports. I have received several QSL cards from them, this being the most recent one. (Clinton enclosed a scan of his most recent card). The cards never seem to change, but they are usually quick to reply. Reception is usually best at night, but varies according to band conditions of course.” (Clinton Hullender)

Clinton received a QSL card for reception of AFN Key West, FL on 7812.5 kHz at 2200 UTC on August 17, 2009. Clinton listens in Cleveland, TN. Thank you very much for the note, Clinton; it’s good to know that AFRTS is still broadcasting!

Please feel free to contact the editor by postal mail, e-mail, Facebook, Twitter or even pony express, assuming you can find a pony! Your comments, criticisms, suggestions, ideas and contributions are always welcome! Cheers until next month!



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before

print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af: Africa
 al: alternate frequency (occasional use only)
 am: The Americas
 as: Asia
 ca: Central America
 do: domestic broadcast
 eu: Europe
 me: Middle East
 na: North America
 pa: Pacific
 sa: South America
 va: various

Mode used by all stations in this guide is AM unless otherwise indicated.

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Additional Contributors to This Month's Shortwave Guide:

Thank You to ...

BCL News; DX Asia; British DX Club; Cumbre DX; DSWCI-DX Window, Hard-Core DX; Radio Bulgaria DX Mix News; Media Broadcast, Play DX; WWDXC-BC DX-Top News; World DX Club/Contact, PTSW; World Radio TV Handbook.

Alokesh Gupta, New Delhi, India; Mike Barraclough, UK; Ivo Ivanov; Bulgaria; Sean Gilbert, UK; Rachel Baughn/MT; Ron Howard, CA; Frank Klimek, Colby, WI; Hans Johnson; Rich D' Angelo/NASWA-Flash Sheet, NASWA-Journal; Tom Taylor, UK.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide.

"MISSING" LANGUAGES?

A **FREE** download to MTXpress subscribers, the online MTXtra Shortwave Guide is 115+ pages of combined language schedules, sorted by time. Print subscribers: add the MTXtra SW Guide to your subscription for only \$11.95. Call **1-800-438-8155** or visit **www.monitoringtimes.com** to learn how.

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0004	Canada, Radio Canada International	6100na
0000	0015	mtwhf Moldova, (Transnistria) Radio PMR	9665na
0000	0027	Czech Republic, Radio Prague	9790na
0000	0030	Egypt, Radio Cairo	11590na
0000	0030	vi Guyana, Voice of Guyana	3290va
0000	0030	Thailand, Radio Thailand World Service	15275na
0000	0030	USA, Voice of America	7555af
0000	0045	India, All India Radio	6055as 7305as
		9705as 9950as 11645as	13605as
0000	0056	Romania, Radio Romania International	7385na
		9580na	
0000	0057	Canada, Radio Canada International	11700as
0000	0100	Anguilla, Worldwide Univ Network	6090am
0000	0100	Australia, ABC NT Alice Springs	4835do
0000	0100	Australia, ABC NT Katherine	5025do
0000	0100	Australia, ABC NT Tennant Creek	4910do
0000	0100	Australia, Radio Australia	9660pa 12080pa
		13690pa 15230pa 15415as	17750as
		17715pa 17795pa	
0000	0100	Bahrain, Radio Bahrain	6010me
0000	0100	Canada, CFRX Toronto ON	6070na
0000	0100	Canada, CFVP Calgary AB	6030na
0000	0100	Canada, CKZN St Johns NF	6160na
0000	0100	Canada, CKZU Vancouver BC	6160na
0000	0100	China, China Radio International	6020eu
		6075as 6180as 7350eu	7415as
		9570eu 11790as 11885as	13750as
0000	0100	Germany, Deutsche Welle	9885as 15595as
		17525as	
0000	0100	Malaysia, RTM/Traxx FM	7295do
0000	0100	New Zealand, Radio NZ International	15730pa
0000	0100	DRM New Zealand, Radio NZ International	15720pa
0000	0100	Russia, Voice of Russia	9890na
0000	0100	Spain, Radio Exterior de Espana	6055na
0000	0100	Sri Lanka, SLBC	6005as 9770as
0000	0100	UK, BBC World Service	5970as 6195as
		7395as 9740as 12095as	13725as
0000	0100	Ukraine, Radio Ukraine International	7440na
0000	0100	USA, American Forces Network	4319usb
		5446usb 5765usb 7812usb	12133usb
		12759usb 13362usb	
0000	0100	USA, WBCQ Monticello ME	7415am 9330am
0000	0100	sm USA, WBCQ Monticello ME	5110am
0000	0100	USA, WEWN Vandiver AL	11520af
0000	0100	m USA, WHRI Cypress Creek SC	7315am
0000	0100	Sun USA, WHRI Cypress Creek SC	5875am
		5920am	
0000	0100	USA, WINB Red Lion PA	9265ca
0000	0100	USA, WRMI Miami FL	9955ca
0000	0100	USA, WTJC Newport NC	9370na
0000	0100	USA, WTWW Lebanon TN	9479va
0000	0100	USA, WWCR Nashville TN	4840na 7465na
		9980na	
0000	0100	USA, WWRB Manchester TN	3185va 3215na
		6890va	
0000	0100	USA, WYFR/Family Radio Worldwide	5950na
		6985na 7360sa 7520sa	9505na
		15440na	
0005	0100	twhfa Canada, Radio Canada International	6100na
0030	0045	twhfes Albania, Radio Tirana	9860na
0030	0100	China, China Radio International	11730as
0030	0100	mtwhfa Serbia, International Radio of Serbia	9675na
0030	0100	Thailand, Radio Thailand World Service	15275na
0030	0100	Sun UK, Bible Voice Broadcasting	7405as
0030	0100	USA, Voice of America/Special English	7430as
		9715as 9780va 11725va	15205va
		15290va 15560va 17820va	
0045	0100	mtwhf Moldova, (Transnistria) Radio PMR	9665eu
0045	0100	Sun Palau, T8WH/WHRI/Sound of Hope Radio	15710as

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0105	twhfa Canada, Radio Canada International	6100na
0100	0127	Czech Republic, Radio Prague	7345na
0100	0130	China, China Radio International	11730as
0100	0130	Slovakia, Radio Slovakia International	5930na
		9440sa	
0100	0130	Vietnam, Voice of Vietnam	6175na
0100	0157	North Korea, Voice of Korea	9345as 9730as
		11735sa 13760as 15180as	
0100	0159	Canada, Radio Canada International	9620as
0100	0200	Anguilla, Worldwide Univ Network	6090am
0100	0200	Australia, ABC NT Alice Springs	4835do

0100	0200	Australia, ABC NT Katherine	5025do
0100	0200	Australia, ABC NT Tennant Creek	4910do
0100	0200	Australia, Radio Australia	9660pa 12080pa
		13690pa 15230pa 15415as	17750as
		17715pa 17795pa	
0100	0200	Bahrain, Radio Bahrain	6010me
0100	0200	Canada, CFRX Toronto ON	6070na
0100	0200	Canada, CFVP Calgary AB	6030na
0100	0200	Canada, CKZN St Johns NF	6160na
0100	0200	Canada, CKZU Vancouver BC	6160na
0100	0200	China, China Radio International	6020eu
		6175eu 9410eu 9470eu	9535eu
		9570eu 9580na 9790na	11870as
		15785as	
0100	0200	DRM China, China Radio International	6080na
0100	0200	Cuba, Radio Havana Cuba	5970na 6000na
0100	0200	vi Guyana, Voice of Guyana	3290va
0100	0200	Malaysia, RTM/Traxx FM	7295do
0100	0200	New Zealand, Radio NZ International	13730pa
0100	0200	DRM New Zealand, Radio NZ International	15720pa
0100	0200	Russia, Voice of Russia	9890na
0100	0200	Sri Lanka, SLBC	6005as 9770as
0100	0200	Taiwan, Radio Taiwan International	11875as
0100	0200	UK, BBC World Service	5970as 6195as
		7395as 9410as 9740as	11750as
		12095as 13725as 15310as	15335as
		15360as 17615as	
0100	0200	USA, American Forces Network	4319usb
		5446usb 5765usb 7812usb	12133usb
		12759usb 13362usb	
0100	0200	USA, KJES Vado NM	7555na
0100	0200	USA, Voice of America	7430va 9780va
		11705va	
0100	0200	USA, WBCQ Monticello ME	7415am 9330am
0100	0200	sm USA, WBCQ Monticello ME	5110am
0100	0200	USA, WEWN Vandiver AL	11520af
0100	0200	twhfa USA, WHRI Cypress Creek SC	5920am
		7315am	
0100	0200	USA, WINB Red Lion PA	9265ca
0100	0200	USA, WRMI Miami FL	9955ca
0100	0200	USA, WRNO New Orleans LA	7505am
0100	0200	USA, WTJC Newport NC	9370na
0100	0200	USA, WTWW Lebanon TN	9575va
0100	0200	USA, WWCR Nashville TN	3215na 4840na
		9980na	
0100	0200	USA, WWRB Manchester TN	3145va 3185va
		6980va	
0100	0200	USA, WYFR/Family Radio Worldwide	6985na
		9505na 15440na	
0130	0200	Iran, VOIRI/IRIB	7245na 9495na
0130	0200	Sweden, Radio Sweden	6010na
0130	0200	twhfa USA, Voice of America/Special English	7465ca
		9820ca	
0140	0200	Vatican City State, Vatican Radio	7335va
		9580as 9650va 11850va	
0145	0200	twhfes Albania, Radio Tirana	7425na

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0215	Croatia, Croatian Radio	3985eu 9925am
0200	0227	Iran, VOIRI/IRIB	7245na 9495na
0200	0230	Thailand, Radio Thailand World Service	15275na
0200	0230	USA, KJES Vado NM	7555na
0200	0245	USA, WYFR/Family Radio Worldwide	11835na
0200	0257	North Korea, Voice of Korea	13650as 15100as
0200	0300	Anguilla, Worldwide Univ Network	6090am
0200	0300	twhfa Argentina, Radio Nacional RAE	11710am
0200	0300	Australia, ABC NT Alice Springs	4835do
0200	0300	Australia, ABC NT Katherine	5025do
0200	0300	Australia, ABC NT Tennant Creek	4910do
0200	0300	Australia, Radio Australia	9660pa 12080pa
		13690pa 15230pa 15415as	15515pa
		17750as 21725pa	
0200	0300	Bahrain, Radio Bahrain	6010me
0200	0300	Bulgaria, Radio Bulgaria	9700na 11700na
0200	0300	Canada, CFRX Toronto ON	6070na
0200	0300	Canada, CFVP Calgary AB	6030na
0200	0300	Canada, CKZN St Johns NF	6160na
0200	0300	Canada, CKZU Vancouver BC	6160na
0200	0300	China, China Radio International	11770as
		13640as	
0200	0300	Cuba, Radio Havana Cuba	5970na 6000na
0200	0300	Egypt, Radio Cairo	6270na
0200	0300	vi Guyana, Voice of Guyana	3290va
0200	0300	Malaysia, RTM/Traxx FM	7295do
0200	0300	New Zealand, Radio NZ International	13730pa
0200	0300	DRM New Zealand, Radio NZ International	15720pa

0200	0300	Philippines, PBS/ Radyo Pilipinas	11880me
		15510me 15285me	
0200	0300	Russia, Voice of Russia	7440na 9665na
		15425na	
0200	0300	South Korea, KBS World Radio	9580sa
0200	0300	Taiwan, Radio Taiwan International	5950na
		9680ca	
0200	0300	UK, BBC World Service	6005af 6195as
		9410as 12095as 15310as	
0200	0300	Ukraine, Radio Ukraine International	7440na
0200	0300	USA, American Forces Network	4319usb
		5446usb 5765usb 7812usb	12133usb
		12759usb 13362usb	
0200	0300	USA, WBCQ Monticello ME	7415am 9330am
0200	0300	USA, WBCQ Monticello ME	5110am
0200	0300	USA, WEWN Vandiver AL	11520af
0200	0300	USA, WHRI Cypress Creek SC	5875na
		7315am	
0200	0300	USA, WINB Red Lion PA	9265ca
0200	0300	USA, WRMI Miami FL	9955ca
0200	0300	USA, WRNO New Orleans LA	7505am
0200	0300	USA, WTJC Newport NC	9370na
0200	0300	USA, WTWW Lebanon TN	5755va
0200	0300	USA, WWCN Nashville TN	3215na 4840na
		5890na	
0200	0300	USA, WWRB Manchester TN	3145va 3185va
		5050va 6890va	
0200	0300	USA, WYFR/Family Radio Worldwide	5985ca
		6100sa 6985na 9385ca	9505na
0215	0230	Nepal, Radio Nepal	5005as
0215	0300	Uganda, UBC Radio	4976do
0230	0300	Albania, Radio Tirana	7425na
0230	0300	Sweden, Radio Sweden	6010na
0230	0300	Vietnam, Voice of Vietnam	6175na
0245	0300	Australia, HCJB Global Voice Australia	15400as
0245	0300	India, All India Radio	3945do
0250	0300	Vatican City State, Vatican Radio	7305am
		9610am	

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0315	Sun	Swaziland, TWR Swaziland	3200af
0300	0327		Czech Republic, Radio Prague	7345na
0300	0330		Egypt, Radio Cairo	6270na
0300	0330		Philippines, PBS/ Radyo Pilipinas	11880me
			15510me 15285me	
0300	0330		Sri Lanka, SLBC	6005as 9770as
0300	0330		Vatican City State, Vatican Radio	7360af
			9660af	
0300	0355		South Africa, Channel Africa	6135af
0300	0356		Romania, Radio Romania International	7335na
			9645na 11895as 15340as	
0300	0357		North Korea, Voice of Korea	7200as 9345as
			9730as	
0300	0400		Anguilla, Worldwide Univ Network	6090am
0300	0400		Australia, ABC NT Alice Springs	4835do
0300	0400		Australia, ABC NT Katherine	5025do
0300	0400		Australia, ABC NT Tennant Creek	4910do
0300	0400		Australia, Radio Australia	9660pa 12080pa
			13690pa 15230pa 15415as	15515pa
			17750as 21725pa	
0300	0400		Bahrain, Radio Bahrain	6010me
0300	0400	twhf	Canada, CBC NQ SW Service	9625na
0300	0400		Canada, CFRX Toronto ON	6070na
0300	0400		Canada, CFVP Calgary AB	6030na
0300	0400		Canada, CKZN St Johns NF	6160na
0300	0400		Canada, CKZU Vancouver BC	6160na
0300	0400		China, China Radio International	9690na
			9790na 11770as 15110as	15120eu
			15785as	
0300	0400		Cuba, Radio Havana Cuba	5970na 6000na
0300	0400		Germany, Deutsche Welle	12005as 15595as
0300	0400	vl	Guyana, Voice of Guyana	3290va
0300	0400		Malaysia, RTM/Traxx FM	7295do
0300	0400		New Zealand, Radio NZ International	13730pa
0300	0400	DRM	New Zealand, Radio NZ International	15720pa
0300	0400		Oman, Radio Sultanate of Oman	15355af
0300	0400		Russia, Voice of Russia	9665sa 15425na
			15585as	
0300	0400	DRM	Russia, Voice of Russia	15735as
0300	0400		South Africa, Channel Africa	3345af
0300	0400		Taiwan, Radio Taiwan International	5950na
			15320as	
0300	0400		Turkey, Voice of Turkey	5975va 6165va
0300	0400		Uganda, UBC Radio	4976do

0300	0400		UK, BBC World Service	3255af	6005af
			6145af	6190af	6195va
			9750af	11945af	12035as
			15310as	17790as	12095as
0300	0400		USA, American Forces Network		4319usb
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
0300	0400		USA, Voice of America	4930af	6080af
			9885af	15580af	
0300	0400		USA, WBCQ Monticello ME	7415am	9330am
0300	0400		USA, WEWN Vandiver AL	9455af	
0300	0400	Sat	USA, WHRI Cypress Creek SC		7315am
0300	0400		USA, WINB Red Lion PA	9265ca	
0300	0400		USA, WRMI Miami FL	9955ca	
0300	0400		USA, WRNO New Orleans LA		7505am
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WTWW Lebanon TN	5755va	
0300	0400		USA, WWCN Nashville TN	3215na	4840na
			5890na		
0300	0400		USA, WWRB Manchester TN	3145va	3185va
			5050va	6890va	
0300	0400		USA, WYFR/Family Radio Worldwide		6985na
			9505na	11740sa	15255sa
0315	0330		Palau, T8WH/WHRI/Sound of Hope Radio		
			15700as		
0330	0357		Czech Republic, Radio Prague		9445me
0330	0400	twhfas	Albania, Radio Tirana	7425na	
0330	0400	Sun	Sri Lanka, SLBC	6005as	9770as
0330	0400		UK, BBC World Service	11945af	15745as
0330	0400		Vietnam, Voice of Vietnam	6175na	
0340	0400		Vatican City State, Vatican Radio		15460va
0345	0400	vl/Sat/Sun	Uganda, UBC Radio	4976do	

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430	mtwhf	France, Radio France Internationale	7425af
			9805af	
0400	0430	Sun	Sri Lanka, SLBC	6005as 9770as
0400	0430		USA, Voice of America	4930af 9460af
			6080af 9885af 15580af	
0400	0445		USA, WYFR/Family Radio Worldwide	6985na
			9505na	
0400	0458		New Zealand, Radio NZ International	13730pa
0400	0458	DRM	New Zealand, Radio NZ International	15720pa
0400	0500		Anguilla, Worldwide Univ Network	6090am
0400	0500		Australia, ABC NT Alice Springs	4835do
0400	0500		Australia, ABC NT Katherine	5025do
0400	0500		Australia, ABC NT Tennant Creek	4910do
0400	0500		Australia, Radio Australia	9660pa 12080pa
			13690pa 15230pa 15415as	15515pa
			17750as 21725pa	
0400	0500		Bahrain, Radio Bahrain	6010me
0400	0500	twhf	Canada, CBC NQ SW Service	9625na
0400	0500		Canada, CFRX Toronto ON	6070na
0400	0500		Canada, CKZN St Johns NF	6160na
0400	0500		Canada, CKZU Vancouver BC	6160na
0400	0500		China, China Radio International	9690na
			9790na 11770as 15110as	15120eu
			15785as	
0400	0500	vl	Guyana, Voice of Guyana	3290va
0400	0500		Malaysia, RTM/Traxx FM	7295do
0400	0500		Russia, Voice of Russia	13775na
0400	0500		South Africa, Channel Africa	3345af
0400	0500		Sri Lanka, SLBC	6005as 9770as
0400	0500		Uganda, UBC Radio	4976do
0400	0500	DRM	UK, BBC World Service	3995eu
0400	0500		UK, BBC World Service	3255af 6055af
			6190af 7255af 7310af	9410eu
			12035af 12095as 13675eu	15310as
			15360as 17790as	
0400	0500		USA, American Forces Network	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
0400	0500		USA, WEWN Vandiver AL	9455af
0400	0500	Sun	USA, WHRI Cypress Creek SC	7365eu
0400	0500	Sat	USA, WHRI Cypress Creek SC	9825me
0400	0500		USA, WRMI Miami FL	9955ca
0400	0500		USA, WRNO New Orleans LA	7505am
0400	0500		USA, WTJC Newport NC	9370na
0400	0500		USA, WTWW Lebanon TN	5755va
0400	0500		USA, WWCN Nashville TN	3215na 4840na
			5890na	
0400	0500		USA, WWRB Manchester TN	3185na
0400	0500		USA, WYFR/Family Radio Worldwide	9680na

0400	0500	Zambia, 1 Africa-CVC Africa	5925af	
0430	0500	Greece, Voice of Greece	11645eu	
0430	0500	Swaziland, TWR Swaziland	3200af	4775af
0430	0500	USA, Voice of America	4930af	4960af
		6080af	9885af	15580af
0455	0500	Nigeria, Voice of Nigeria/External Service	15120eu	
0459	0500	New Zealand, Radio NZ International	11725pa	
0459	0500	New Zealand, Radio NZ International	11675pa	

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhf	Canada, CBC NQ SW Service	9625na	
0500	0520		Vatican City State, Vatican Radio	4005eu	
			5965eu	7250eu	9660af
			13765af		11625af
0500	0530		China, CNR-11/Holy Tibet	9530do	11685do
			15570do		
0500	0530		Czech Republic, Radio Prague	9955ca	
0500	0530	mtwhf	France, Radio France Internationale	11995af	
			13680af		
0500	0530		Germany, Deutsche Welle	6180af	7430af
			9700af	9825af	
0500	0530		Japan, NHK World/ Radio Japan	5975va	
			6110na	11970as	15205as
					17810as
0500	0530	Sun	UK, BBC World Service	15420af	
0500	0555		Sri Lanka, SLBC	6005as	9770as
					15745as
0500	0600		Anguilla, Worldwide Univ Network	6090am	
0500	0600		Australia, ABC NT Alice Springs	4835do	
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Australia, Radio Australia	9660pa	12080pa
			13630as	15160pa	15230pa
			17750as		15415as
0500	0600		Bahrain, Radio Bahrain	6010me	
0500	0600		Bhutan, Bhutan Broadcasting Service	6035as	
0500	0600		Canada, CFRX Toronto ON	6070na	
0500	0600		Canada, CKZN St Johns NF	6160na	
0500	0600		Canada, CKZU Vancouver BC	6160na	
0500	0600		China, China Radio International	6020na	
			6190na	11710me	11895as
			15465as	17505af	17540as
			17855af		17730af
0500	0600		Cuba, Radio Havana Cuba	5970na	6010na
			6060na		
0500	0600	DRM	Germany, Deutsche Welle	17525as	
0500	0600	mtwhf	Greece, Voice of Greece	11645eu	
0500	0600	vl	Guyana, Voice of Guyana	3290va	
0500	0600		Kuwait, Radio Kuwait	15110as	
0500	0600		Liberia, Star Radio	3900do	4025al
0500	0600		Malaysia, RTM/Traxx FM	7295do	
0500	0600		New Zealand, Radio NZ International	11725pa	
0500	0600	DRM	New Zealand, Radio NZ International	11675pa	
0500	0600		Nigeria, Voice of Nigeria/External Service	15120eu	
0500	0600		Russia, Voice of Russia	13775na	
0500	0600	mtwh	Slovakia, IRRS/Euro Gospel Radio	5990va	
0500	0600		South Africa, Channel Africa	7230af	
0500	0600		Swaziland, TWR Swaziland	3200af	6120af
			9500af		
0500	0600		Taiwan, Radio Taiwan International	5950na	
0500	0600		Uganda, UBC Radio	4976do	
0500	0600		UK, BBC World Service	3995eu	7255af
			7310af	9410eu	11945af
			15310as	15360as	15560eu
			17790as		17640af
0500	0600	mtwhf	UK, BBC World Service	15420af	
0500	0600		Ukraine, Radio Ukraine International	9840na	
0500	0600		USA, American Forces Network	4319usb	
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
0500	0600		USA, Voice of America	4930af	6080af
			12080af	15580af	
0500	0600		USA, WEWN Vandiver AL	6890va	
0500	0600	Sun	USA, WHRI Cypress Creek SC	11565pa	
0500	0600		USA, WRMI Miami FL	9955ca	
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WTTW Lebanon TN	5755va	
0500	0600		USA, WWCN Nashville TN	3215na	4840na
0500	0600		USA, WWRB Manchester TN	3185na	
0500	0600		USA, WYFR/Family Radio Worldwide	9680na	
0500	0600		Zambia, 1 Africa-CVC Africa	9430af	
0515	0530		Rwanda, Radio Rwanda	6055do	
0530	0556		Romania, Radio Romania International	9655eu	
			21500pa	17760pa	

0530	0600	Clandestine, Sudan Radio Service/ SRS	13720af
0530	0600	DRM	Romania, Radio Romania International
0530	0600		Thailand, Radio Thailand World Service
			7305eu
			17655eu

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0630	Sat/Sun	Australia, Radio Australia	15290as	
0600	0630		China, Xizang PBS/Holy Tibet	4905do	4920do
			5240do	6110do	6130do
			9490do	9580do	6200do
0600	0630	mtwhf	France, Radio France Internationale	11615af	
			15160af	17800af	
0600	0630		Germany, Deutsche Welle	7325af	15275af
0600	0630	Sat/Sun	Greece, Voice of Greece/Radio Filia		11645eu
0600	0630		Laos, Lao National Radio	7145as	
0600	0645	mtwhf	South Africa, TWR Africa	11640af	
0600	0658		New Zealand, Radio NZ International	11725pa	
0600	0658	DRM	New Zealand, Radio NZ International	11675pa	
0600	0700		Anguilla, Worldwide Univ Network	6090am	
0600	0700		Australia, ABC NT Alice Springs	4835do	
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Australia, Radio Australia	9660pa	12080pa
			13630as	13690pa	15160pa
			17750as		15230pa
0600	0700		Bahrain, Radio Bahrain	6010me	
0600	0700		Canada, CFRX Toronto ON	6070na	
0600	0700		Canada, CFVP Calgary AB	6030na	
0600	0700		Canada, CKZN St Johns NF	6160na	
0600	0700		Canada, CKZU Vancouver BC	6160na	
0600	0700		China, China Radio International	11710me	
			11870af	11895as	13660as
			15350as	15465as	17505af
			17540as		17540as
0600	0700		Cuba, Radio Havana Cuba	5970na	6010na
			6060na		
0600	0700	DRM	Germany, Deutsche Welle	3995eu	6130eu
0600	0700	vl	Guyana, Voice of Guyana	3290va	
0600	0700		Kuwait, Radio Kuwait	15110as	
0600	0700		Liberia, Star Radio	3900do	4025al
0600	0700		Malaysia, RTM/Traxx FM	7295do	
0600	0700		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as	15295as	
0600	0700		Nigeria, Voice of Nigeria/External Service	15120eu	
0600	0700		Papua New Guinea, Radio Wantok Light	7325do	
0600	0700		Russia, Voice of Russia	15405pa	
0600	0700		South Africa, Channel Africa	7230af	
0600	0700		Swaziland, TWR Swaziland	4775af	6120af
			9500af		
0600	0700		Uganda, UBC Radio	7195do	
0600	0700		UK, BBC World Service	3995eu	6005af
			6190af	7310af	9860af
			12095as	15105af	12015af
			17790as		17640af
0600	0700	Sat/Sun	UK, BBC World Service	15420af	
0600	0700	DRM	UK, BBC World Service	3995eu	
0600	0700		USA, American Forces Network	4319usb	
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
0600	0700		USA, Voice of America	6080af	12080af
			15580af		
0600	0700		USA, WEWN Vandiver AL	6890va	
0600	0700	Sun	USA, WHRI Cypress Creek SC	7365eu	
0600	0700		USA, WRMI Miami FL	9955ca	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WTTW Lebanon TN	5755va	
0600	0700		USA, WWCN Nashville TN	3215na	4840na
0600	0700		USA, WWRB Manchester TN	3185na	
0600	0700		USA, WYFR/Family Radio Worldwide	5850ca	
			7520va	9680na	11530af
					11580va
0600	0700		Zambia, 1 Africa-CVC Africa	13590af	
0600	0700	vl	Zambia, Radio Christian Voice/The Voice Africa	6065af	
0600	615	Sat/Sun	South Africa, TWR Africa	11640af	
0630	0645		Vatican City State, Vatican Radio	4005eu	
			5965eu	7250eu	9645af
			15595eu		11740eu
0630	0700		Bulgaria, Radio Bulgaria	9600eu	11600eu
0630	0700		Vatican City State, Vatican Radio	11625af	
			13765af	15570af	
0645	0700	Sun	Germany, TWR Europe	6105eu	
0645	0700	Sun	Monaco, TWR Europe	9800eu	
0659	0700		New Zealand, Radio NZ International	6170pa	
0659	0700	DRM	New Zealand, Radio NZ International	7440pa	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0727	Czech Republic, Radio Prague	9880eu
0700	0730	France, Radio France Internationale	13675af
0700	0730	Slovakia, Radio Slovakia International	9440va
		11650va	
0700	0730	Sun UK, Bible Voice Broadcasting	5945eu
0700	0745	Sat UK, Bible Voice Broadcasting	5945eu
0700	0745	USA, WYFR/Family Radio Worldwide	7520va
0700	0750	Sun Germany, TWR Europe	6105eu
0700	0750	mtwhf Germany, TWR Europe	6105eu
0700	0750	mtwhf Monaco, TWR Europe	9800eu
0700	0800	Anguilla, Worldwide Univ Network	6090am
0700	0800	Australia, ABC NT Alice Springs	4835do
0700	0800	Australia, ABC NT Katherine	5025do
0700	0800	Australia, ABC NT Tennant Creek	4910do
0700	0800	Australia, Radio Australia	9475as
		9710as	12080pa
0700	0800	Bahrain, Radio Bahrain	6010me
0700	0800	m/DRM Belgium, TDP Radio	6015eu
0700	0800	Canada, CFRX Toronto ON	6070na
0700	0800	Canada, CFVP Calgary AB	6030na
0700	0800	Canada, CKZN St Johns NF	6160na
0700	0800	Canada, CKZU Vancouver BC	6160na
0700	0800	China, China Radio International	11895as
		13660as	13710eu
		15125me	15350as
		17710as	
0700	0800	mtwhf Equatorial Guinea, Radio Africa # 2	15190af
0700	0800	Sat/Sun Equatorial Guinea, Radio East Africa	15190af
0700	0800	DRM Germany, Deutsche Welle	5790eu
0700	0800	vi Guyana, Voice of Guyana	3290va
0700	0800	Kuwait, Radio Kuwait	15110as
0700	0800	Liberia, Star Radio	3900do
0700	0800	Malaysia, RTM/Traxx FM	7295do
0700	0800	Malaysia, RTM/Voice of Malaysia	6175as
		9750as	15295as
0700	0800	Myanmar, Myanma Radio	9730do
0700	0800	New Zealand, Radio NZ International	6170pa
0700	0800	DRM New Zealand, Radio NZ International	7440pa
0700	0800	Papua New Guinea, Radio Wantok Light	7325do
0700	0800	Russia, Voice of Russia	15405pa
0700	0800	South Africa, Channel Africa	7230af
0700	0800	Swaziland, TWR Swaziland	4775af
		9500af	6120af
0700	0800	Uganda, UBC Radio	7195do
0700	0800	UK, BBC World Service	5790eu
		9860af	11760me
		15400af	15575as
		15420af	17790as
0700	0800	Sat/Sun UK, BBC World Service	15420af
0700	0800	Ukraine, Radio Ukraine International	11620eu
0700	0800	USA, American Forces Network	4319usb
		5446usb	5765usb
		12759usb	7812usb
		13362usb	12133usb
0700	0800	USA, WEWN Vandiver AL	6890va
0700	0800	Sun USA, WHRI Cypress Creek SC	11565pa
0700	0800	USA, WRMI Miami FL	9955ca
0700	0800	USA, WTJC Newport NC	9370na
0700	0800	USA, WTTW Lebanon TN	5755va
0700	0800	USA, WWRB Nashville TN	3215na
0700	0800	USA, WWRB Manchester TN	3185na
0700	0800	USA, WYFR/Family Radio Worldwide	5950na
		5985na	6875na
		9385af	9505ca
0700	0800	Zambia, 1 Africa-CVC Africa	13590af
0700	0800	vi Zambia, Radio Christian Voice/The Voice Africa	6065af
0715	0750	Sat Germany, TWR Europe	6105eu
0715	0750	Sat Monaco, TWR Europe	9800eu
0730	0800	Australia, HCJB Global Voice Australia	11750as
0730	0800	Clandestine, Cotton Tree News	15220af

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0830	Australia, ABC NT Alice Springs	4835do
0800	0830	Australia, ABC NT Katherine	5025do
0800	0830	Australia, ABC NT Tennant Creek	4910do
0800	0830	Myanmar, Myanma Radio	9730do
0800	0845	USA, WYFR/Family Radio Worldwide	5950na
		5985na	9385af
0800	0900	Anguilla, Worldwide Univ Network	6090am
0800	0900	Australia, HCJB Global Voice Australia	11750pa
0800	0900	Australia, Radio Australia	5995pa
		9580pa	9590pa
		12080pa	9710pa
		13630as	11945pa
0800	0900	Bahrain, Radio Bahrain	6010me
0800	0900	t/DRM Belgium, TDP Radio	6015eu
0800	0900	Bhutan, Bhutan Broadcasting Service	6035as

0800	0900	Canada, CFRX Toronto ON	6070na
0800	0900	Canada, CFVP Calgary AB	6030na
0800	0900	Canada, CKZN St Johns NF	6160na
0800	0900	Canada, CKZU Vancouver BC	6160na
0800	0900	China, China Radio International	11620as
		11895as	13710eu
		15625me	15350as
		17540as	
0800	0900	mtwhf Equatorial Guinea, Radio Africa # 2	15190af
0800	0900	Sat/Sun Equatorial Guinea, Radio East Africa	15190af
0800	0900	DRM Germany, Deutsche Welle	12095as
0800	0900	vi Guyana, Voice of Guyana	3290va
0800	0900	Liberia, Star Radio	3900do
0800	0900	Malaysia, RTM/Traxx FM	7295do
0800	0900	Malaysia, RTM/Voice of Malaysia	6175as
		9750as	15295as
0800	0900	New Zealand, Radio NZ International	6170pa
0800	0900	DRM New Zealand, Radio NZ International	7440pa
0800	0900	Papua New Guinea, Radio Wantok Light	7325do
0800	0900	DRM Russia, Voice of Russia	12060eu
0800	0900	Sun South Africa, Amateur Radio Mirror Intl	7205af
		17570af	
0800	0900	South Africa, Channel Africa	9625af
0800	0900	South Korea, KBS World Radio	9570as
0800	0900	Swaziland, TWR Swaziland	4775af
		9500af	6120af
0800	0900	Uganda, UBC Radio	7195do
0800	0900	UK, BBC World Service	6190af
		11760me	15310as
		17640af	15400af
		17790as	17830af
0800	0900	Ukraine, Radio Ukraine International	11620eu
0800	0900	USA, American Forces Network	4319usb
		5446usb	5765usb
		12759usb	7812usb
		13362usb	12133usb
0800	0900	USA, KNLS Anchor Point AK	11765as
0800	0900	USA, WEWN Vandiver AL	6890va
0800	0900	smtwhf USA, WHRI Cypress Creek SC	11565pa
0800	0900	USA, WRMI Miami FL	9955ca
0800	0900	USA, WTJC Newport NC	9370na
0800	0900	USA, WTTW Lebanon TN	5755va
0800	0900	USA, WWRB Nashville TN	3215na
0800	0900	USA, WWRB Manchester TN	3185na
0800	0900	USA, WYFR/Family Radio Worldwide	5985na
		6875na	
0800	0900	Zambia, 1 Africa-CVC Africa	13590af
0800	0900	vi Zambia, Radio Christian Voice/The Voice Africa	6065af
0815	0825	Nepal, Radio Nepal	5005as
0820	0900	smtwhf Guam, KTW/TWR	15170as
0830	0900	Australia, ABC NT Alice Springs	2310do
0830	0900	Australia, ABC NT Katherine	2485do
0830	0900	Australia, ABC NT Tennant Creek	2325do
0830	0900	mtwhfa Guam, KTW/TWR	11840pa
0845	0900	mtwhf Palau, T8WH/WHRI/Sound of Hope Radio	9930as

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0910	mtwhfa Guam, KTW/TWR	11840pa
0900	0915	mtwhf Palau, T8WH/WHRI/Sound of Hope Radio	9930as
0900	0929	Czech Republic, Radio Prague	17650af
0900	0930	Australia, HCJB Global Voice Australia	11750pa
0900	0930	DRM Bulgaria, Radio Bulgaria	11900eu
0900	0959	Germany, Deutsche Welle	15640as
0900	1000	Anguilla, Worldwide Univ Network	6090am
0900	1000	Australia, ABC NT Alice Springs	2310do
0900	1000	Australia, ABC NT Katherine	2485do
0900	1000	Australia, ABC NT Tennant Creek	2325do
0900	1000	Australia, Radio Australia	9475as
		9590pa	11945pa
0900	1000	Bahrain, Radio Bahrain	6010me
0900	1000	w/DRM Belgium, TDP Radio	6015eu
0900	1000	Canada, CFRX Toronto ON	6070na
0900	1000	Canada, CFVP Calgary AB	6030na
0900	1000	Canada, CKZN St Johns NF	6160na
0900	1000	Canada, CKZU Vancouver BC	6160na
0900	1000	China, China Radio International	11620as
		13790pa	15210as
		17490eu	15270eu
		17570eu	17750as
0900	1000	mtwhf Equatorial Guinea, Radio Africa # 2	15190af
0900	1000	Sat/Sun Equatorial Guinea, Radio East Africa	15190af
0900	1000	2nd Sun Germany, Blue Star Radio	6140eu
0900	1000	4th Sun Germany, Radio Gloria International	6140eu
0900	1000	Malaysia, RTM/Traxx FM	7295do
0900	1000	Malaysia, RTM/Voice of Malaysia	6175as
		9750as	15295as
0900	1000	New Zealand, Radio NZ International	6170pa

0900	1000	DRM	New Zealand, Radio NZ International	7440pa
0900	1000		Nigeria, Voice of Nigeria/External Service	9690af
0900	1000		Papua New Guinea, Radio Wantok Light	7325do
0900	1000		Russia, Voice of Russia	17495pa
0900	1000	DRM	Russia, Voice of Russia	12060eu
0900	1000	3rd Sat	Slovakia, IRRS/Radio City	9510va
0900	1000	1st Sat	Slovakia, IRRS/Radio Joystick	9510va
0900	1000		Tajikistan, Voice of Tajik/External Service	7245va
0900	1000		Uganda, UBC Radio	7195do
0900	1000	DRM	UK, BBC World Service	9610eu 13810eu
0900	1000		UK, BBC World Service	6190af 6195as
			9740as 9860af 11760me 15105as	
			15285as 15310as 15400af 15575as	
			17640as 17760as 17830af 21470af	
			21660as	
0900	1000		Ukraine, Radio Ukraine International	11620na
0900	1000		USA, American Forces Network	4319usb
			5446usb 5765usb 7812usb 12133usb	
			12759usb 13362usb	
0900	1000		USA, WEWN Vandiver AL	11520va
0900	1000	Sun	USA, WHRI Cypress Creek SC	11565pa
0900	1000		USA, WRMI Miami FL	9955ca
0900	1000		USA, WTJC Newport NC	9370na
0900	1000		USA, WTWV Lebanon TN	5755va
0900	1000		USA, WWCN Nashville TN	4840na 9985na
0900	1000		USA, WWRB Manchester TN	3185na
0900	1000		USA, WYFR/Family Radio Worldwide	5985na
			6875na 9465as 9755na	
0900	1000		Zambia, 1 Africa-CVC Africa	13590af
0900	1000	vl	Zambia, Radio Christian Voice/The Voice Africa	6065af
0930	1000		Saudi Arabia, BSKSA/Saudi Radio	15250af
0930	1000	Sun	Slovakia, IRRS/Euro Gospel Radio	9515va

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030		Czech Republic, Radio Prague	9955na
1000	1030		Japan, NHK World/ Radio Japan	9605as
			9625pa 9825pa 11780as	
1000	1030	fa	Philippines, FEBC	15325as
1000	1030		Vietnam, Voice of Vietnam	9840as 12020as
1000	1057		Netherlands, R Netherlands Worldwide	11895as
			12065as 15110as	
1000	1057		North Korea, Voice of Korea	11710sa 11735sa
			13650as 15180sa	
1000	1058		New Zealand, Radio NZ International	6170pa
1000	1100		Anguilla, Worldwide Univ Network	11775am
1000	1100		Australia, ABC NT Alice Springs	2310do
1000	1100		Australia, ABC NT Katherine	2485do
1000	1100		Australia, ABC NT Tennant Creek	2325do
1000	1100		Australia, Radio Australia	9475as 9580pa 9590pa 9965as
			9590pa 11945pa	
1000	1100		Bahrain, Radio Bahrain	6010me
1000	1100	h/DRM	Belgium, TDP Radio	6015eu
1000	1100		Canada, CFRX Toronto ON	6070na
1000	1100		Canada, CFVP Calgary AB	6030na
1000	1100		Canada, CKZN St Johns NF	6160na
1000	1100		Canada, CKZU Vancouver BC	6160na
1000	1100		China, China Radio International	6040na
			11610as 11635eu 13590as 13620as	
			13720as 13790pa 15190as 15350as	
			17490eu	
1000	1100	mtwhf	Equatorial Guinea, Radio Africa # 2	15190af
1000	1100	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
1000	1100	DRM	Germany, Deutsche Welle	9545eu 13810eu
1000	1100	3rd Sun	Germany, European Music Radio	6140eu
1000	1100		India, All India Radio	7270as 13695pa
			15020as 15260as 15410pa 17800pa	
			17895pa	
1000	1100		Indonesia, Voice of Indonesia	9526va 11785al
1000	1100		Malaysia, RTM/Traxx FM	7295do
1000	1100	DRM	New Zealand, Radio NZ International	7440pa
1000	1100		Nigeria, Voice of Nigeria/External Service	9690af
1000	1100	mt	Palau, T8WH/WHRI/Sound of Hope Radio	9930as 15725as
1000	1100	hfa	Palau, T8WH/WHRI/Sound of Hope Radio	9930as
1000	1100		Papua New Guinea, Radio Wantok Light	7325do
1000	1100		Saudi Arabia, BSKSA/Saudi Radio	15250af
			15470af	
1000	1100	Sun	Slovakia, IRRS/Euro Gospel Radio	9515va
1000	1100		Uganda, UBC Radio	7195do
1000	1100	DRM	UK, BBC World Service	9545eu 13810eu
1000	1100	Sat/Sun	UK, BBC World Service	15400af 17830af

1000	1100		UK, BBC World Service	6190af 6195as
			9545eu 9740as 9860af 11760me	
			15285as 15310as 15575as 17640af	
			17790as 21470af 21660as	
1000	1100		USA, American Forces Network	4319usb
			5446usb 5765usb 7812usb 12133usb	
			12759usb 13362usb	
1000	1100		USA, KNLS Anchor Point AK	11765as
1000	1100		USA, WEWN Vandiver AL	11520va
1000	1100		USA, WINB Red Lion PA	9265ca
1000	1100		USA, WRMI Miami FL	9955ca
1000	1100		USA, WTJC Newport NC	9370na
1000	1100		USA, WTWV Lebanon TN	5755va
1000	1100		USA, WWCN Nashville TN	4840na 9985na
1000	1100		USA, WWRB Manchester TN	3185na
1000	1100		USA, WYFR/Family Radio Worldwide	5950na
			5985na 6875na 9450as 9465as	
			9755na	
1000	1100		Zambia, 1 Africa-CVC Africa	13590af
1000	1100	vl	Zambia, Radio Christian Voice/The Voice Africa	6065af
1030	1057		Czech Republic, Radio Prague	9880eu
1030	1100		Iran, VOIRI/IRIB	15600as 17660as
1030	1100		Mongolia, Voice of Mongolia	12085as
1059	1100		New Zealand, Radio NZ International	9655pa

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1105		Pakistan, PBC/Radio Pakistan	15100as 17720as
1100	1127		Iran, VOIRI/IRIB	15600as 17660as
1100	1130	f/DRM	Japan, NHK World/ Radio Japan	9760eu
1100	1130	Sat/DRM	South Korea, KBS World Radio	9760eu
1100	1130	mtwhf	UK, BBC World Service	15400af
1100	1130		Vietnam, Voice of Vietnam	7285as
1100	1145		USA, WYFR/Family Radio Worldwide	6875na
			9550sa 9755na	
1100	1156		Romania, Radio Romania International	15210eu
			15430eu 17510af 17670af	
1100	1158	DRM	New Zealand, Radio NZ International	7440pa
1100	1200		Anguilla, Worldwide Univ Network	11775am
1100	1200		Australia, ABC NT Alice Springs	2310do
1100	1200		Australia, ABC NT Katherine	2485do
1100	1200		Australia, ABC NT Tennant Creek	2325do
1100	1200		Australia, Radio Australia	5995pa 6020pa 9965as
			9475as 9580pa 9590pa	
1100	1200	DRM	Australia, Radio Australia	12080pa
1100	1200		Bahrain, Radio Bahrain	6010me
1100	1200	f/DRM	Belgium, TDP Radio	6015eu
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na
1100	1200		Canada, CFRX Toronto ON	6070na
1100	1200		Canada, CFVP Calgary AB	6030na
1100	1200		Canada, CKZN St Johns NF	6160na
1100	1200		Canada, CKZU Vancouver BC	6160na
1100	1200		China, China Radio International	5955as
			6040na 11650as 11660as 11750na	
			11795as 13590as 13645as 13650eu	
			13720as 17490eu	
1100	1200	mtwhf	Equatorial Guinea, Radio Africa # 2	15190af
1100	1200	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
1100	1200		Malaysia, RTM/Traxx FM	7295do
1100	1200		New Zealand, Radio NZ International	9655pa
1100	1200		Nigeria, Voice of Nigeria/External Service	9690af
1100	1200		Papua New Guinea, Radio Wantok Light	7325do
1100	1200		Saudi Arabia, BSKSA/Saudi Radio	15250af
			15470af	
1100	1200	Sun	Slovakia, IRRS/Euro Gospel Radio	9515va
1100	1200		Taiwan, Radio Taiwan International	7445as
			11715as	
1100	1200		Uganda, UBC Radio	7195do
1100	1200		UK, BBC World Service	6190af 6195as
			9545eu 9740as 9860af 11760me	
			15280as 15310as 15575as 17640af	
			17790as 17830af 21470af	
1100	1200		USA, American Forces Network	4319usb
			5446usb 5765usb 7812usb 12133usb	
			12759usb 13362usb	
1100	1200		USA, WEWN Vandiver AL	11520va
1100	1200		USA, WINB Red Lion PA	9265ca
1100	1200		USA, WRMI Miami FL	9955ca
1100	1200		USA, WTJC Newport NC	9370na
1100	1200		USA, WTWV Lebanon TN	5755na
1100	1200		USA, WWCN Nashville TN	4840na 5890na
			15825na	
1100	1200		USA, WWRB Manchester TN	3185na

1100	1200	USA, WYFR/Family Radio Worldwide	5950na	
		5985na 7730sa 9625sa	15560as	
1100	1200	Zambia, 1 Africa-CVC Africa	13590af	
1100	1200	vl Zambia, Radio Christian Voice/The Voice Africa		
		6065af		
1130	1150	f Vatican City State, Vatican Radio	15595as	
		17765as		
1130	1200	Sat/Sun Australia, HCJB Global Voice Australia	15400as	
1130	1200	f Vatican City State, Vatican Radio/Mass	15595me	
		17765me		
1130	1200	Vietnam, Voice of Vietnam	9840as	12020as
1145	1200	Sat/Sun UK, Bible Voice Broadcasting	7245as	

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	Nepal, Radio Nepal	5005as	
1200	1215	Sat/Sun UK, Bible Voice Broadcasting	7245as	
1200	1230	mtwhf France, Radio France Internationale	21620af	
1200	1230	Germany, AWR Europe	15435as	
1200	1230	Japan, NHK World/ Radio Japan	6120na	
		9625pa 9695as 9790eu		
1200	1230	Saudi Arabia, BSKSA/Saudi Radio	15250af	
		15470af		
1200	1230	mtwhfa Vatican City State, Vatican Radio	9830am	
1200	1245	USA, WYFR/Family Radio Worldwide	5950na	
		5985na		
1200	1258	New Zealand, Radio NZ International	9655pa	
1200	1259	Poland, Polskie Radio Warsaw	11675eu	
		11980eu		
1200	1300	Anguilla, Worldwide Univ Network	11775am	
1200	1300	Australia, ABC NT Alice Springs	2310do	
1200	1300	Australia, ABC NT Katherine	2485do	
1200	1300	Australia, ABC NT Tennant Creek	2325do	
1200	1300	Sat/Sun Australia, HCJB Global Voice Australia	15400as	
1200	1300	Australia, Radio Australia	6020pa	9475as
		9580pa 9965as 11945pa		
1200	1300	DRM Australia, Radio Australia	5995pa	
1200	1300	Bahrain, Radio Bahrain	6010me	
1200	1300	a/DRM Belgium, TDP Radio	6015eu	
1200	1300	Sat/Sun Canada, CBC NQ SW Service	9625na	
1200	1300	Canada, CFRX Toronto ON	6070na	
1200	1300	Canada, CFVP Calgary AB	6030na	
1200	1300	Canada, CKZN St Johns NF	6160na	
1200	1300	Canada, CKZU Vancouver BC	6160na	
1200	1300	China, China Radio International	5955as	
		9460as 9660as 9730as 9760pa		
		11650as 11660as 11690me 11760pa		
		11980as 13645as 13650eu 13790eu		
		17490eu		
1200	1300	Sat/Sun Equatorial Guinea, Radio East Africa	15190af	
1200	1300	mtwhf Ethiopia, Radio Ethiopia/National Service		
		5990do 7110do 9704do		
1200	1300	DRM Germany, Deutsche Welle	9545eu	13810eu
1200	1300	Malaysia, RTM/Traxx FM	7295do	
1200	1300	Nigeria, Voice of Nigeria/External Service	9690af	
1200	1300	Papua New Guinea, Radio Wantok Light	7325do	
1200	1300	Russia, Voice of Russia	11500as	
1200	1300	South Korea, KBS World Radio	9650na	
1200	1300	Uganda, UBC Radio	7195do	
1200	1300	UK, BBC World Service	5875as 6190af	
		6195as 9545eu 9740as 9860af		
		11750as 11760me 15310as 15575as		
		17640af 17790as 17830af		
1200	1300	USA, American Forces Network	4319usb	
		5446usb 5765usb 7812usb 12133usb		
		12759usb 13362usb		
1200	1300	USA, KNLS Anchor Point AK	7355as	9680as
1200	1300	USA, Voice of America	7575va	9510va
		9760va 12075va		
1200	1300	USA, WEWN Vandiver AL	11520va	
1200	1300	USA, WHRI Cypress Creek SC	7315na	
1200	1300	USA, WHRI Cypress Creek SC	9410na	
1200	1300	Sun USA, WINB Red Lion PA	9265ca	
1200	1300	USA, WRMI Miami FL	9955ca	
1200	1300	USA, WTJC Newport NC	9370na	
1200	1300	USA, WTWW Lebanon TN	9479na	
1200	1300	USA, WWCR Nashville TN	7490af	9980na
		13845na 15825na		
1200	1300	USA, WWRB Manchester TN	3185na	
1200	1300	USA, WYFR/Family Radio Worldwide	17555sa	
		17795na		
1200	1300	Zambia, 1 Africa-CVC Africa	13590af	
1200	1300	vl Zambia, Radio Christian Voice/The Voice Africa		
		6065af		
1215	1300	Egypt, Radio Cairo	17870as	
1215	1300	mtwhyf UK, BBC World Service	9410ca	11860ca

1230	1300	mtwhf Australia, HCJB Global Voice Australia	15400as	
1230	1300	Bangladesh, Bangladesh Betar	7250as	
1230	1300	Saudi Arabia, BSKSA/Saudi Radio	15470af	
1230	1300	Thailand, Radio Thailand World Service	9890va	
1230	1300	Vietnam, Voice of Vietnam	9840as	12020as
1230	13000	Turkey, Voice of Turkey	15450eu	15520as

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1329	Czech Republic, Radio Prague	11600eu	
1300	1330	Australia, HCJB Global Voice Australia	15400as	
1300	1330	Egypt, Radio Cairo	17870as	
1300	1330	Japan, NHK World/ Radio Japan	11985as	
1300	1330	Turkey, Voice of Turkey	15450as	15520eu
1300	1330	Sat/Sun USA, WHRI Cypress Creek SC	9840na	
1300	1357	North Korea, Voice of Korea	9335eu	11710na
		13760as 15245eu		
1300	1400	Anguilla, Worldwide Univ Network	11775am	
1300	1400	Australia, ABC NT Alice Springs	2310do	
1300	1400	Australia, ABC NT Katherine	2485do	
1300	1400	Australia, Radio Australia	6020pa	9580pa
		9590pa		
1300	1400	DRM Australia, Radio Australia	5995pa	
1300	1400	Bahrain, Radio Bahrain	6010me	
1300	1400	s/DRM Belgium, TDP Radio	6015na	
1300	1400	Sat/Sun Canada, CBC NQ SW Service	9625na	
1300	1400	Canada, CFRX Toronto ON	6070na	
1300	1400	Canada, CFVP Calgary AB	6030na	
1300	1400	Canada, CKZN St Johns NF	6160na	
1300	1400	Canada, CKZU Vancouver BC	6160na	
1300	1400	China, China Radio International	5995as	
		9570na 9650na 9730as 9765as		
		9870as 11660as 11760me 11980as		
		13610eu 13755as 15260na		
1300	1400	Sat/Sun Equatorial Guinea, Radio East Africa	15190af	
1300	1400	Indonesia, Voice of Indonesia	9526va	11785al
1300	1400	Malaysia, RTM/Traxx FM	7295do	
1300	1400	New Zealand, Radio NZ International	6170pa	
1300	1400	Nigeria, Voice of Nigeria/External Service	9690af	
1300	1400	Palau, T8WH/WHRI/Sound of Hope Radio	9930as	
1300	1400	Papua New Guinea, Radio Wantok Light	7325do	
1300	1400	South Korea, KBS World Radio	9770as	
1300	1400	Tajikistan, Voice of Tajik/External Service	7245va	
1300	1400	Uganda, UBC Radio	4976do	
1300	1400	UK, BBC World Service	5875as 6190af	
		6195as 9545eu 9740as 9860af		
		11760me 15310as 15420af 15575as		
		17640af 17790as 17830af		
1300	1400	United States, Overcomer Ministries	6110eu	
1300	1400	USA, American Forces Network	4319usb	
		5446usb 5765usb 7812usb 12133usb		
		12759usb 13362usb		
1300	1400	USA, KJES Vado NM	11715na	
1300	1400	Sat/Sun USA, Voice of America	7575va	9510va
		9760va		
1300	1400	USA, WBCQ Monticello ME	9330am	
1300	1400	USA, WEWN Vandiver AL	13835eu	
1300	1400	USA, WINB Red Lion PA	9265ca	
1300	1400	USA, WRMI Miami FL	9955ca	
1300	1400	USA, WTJC Newport NC	9370na	
1300	1400	USA, WTWW Lebanon TN	9479na	
1300	1400	USA, WWCR Nashville TN	7490af	9980na
		13845na 15825na		
1300	1400	USA, WWRB Manchester TN	3185na	
1300	1400	USA, WYFR/Family Radio Worldwide	11520as	
		11560as 11830na 11910na 12155as		
		13820as 17795na		
1300	1400	Zambia, 1 Africa-CVC Africa	13590af	
1300	1400	vl Zambia, Radio Christian Voice/The Voice Africa		
		6065af		
1305	1400	Sun Greece, Voice of Greece	9420va	15630va
1330	1400	mta Guam, KSDA/AWR	11860as	
1330	1400	India, All India Radio	9690as	11620as
		13710as		
1330	1400	Laos, Lao National Radio	7145as	
1330	1400	Sweden, Radio Sweden	15735va	
1330	1400	Vietnam, Voice of Vietnam	9840as	12020as

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1425	mh Guam, KTWB/TWR	9975as	
1400	1430	China, CNR-11/Holy Tibet	6010do	7350do
		9480do		
1400	1430	Sun Germany, Pan American Broadcasting	15205as	

1400 1430		Japan, NHK World/ Radio Japan	11705as
		11985as 21560va	
1400 1430		Thailand, Radio Thailand World Service	9575va
1400 1430	Sun	United Arab Emirates, FEBA Radio	12025as
1400 1435	twfas	Guam, KTWV/TWR	9975as
1400 1500		Anguilla, Worldwide Univ Network	11775am
1400 1500		Australia, ABC NT Alice Springs	2310do
1400 1500		Australia, ABC NT Katherine	2485do
1400 1500		Australia, ABC NT Tennant Creek	2325do
1400 1500		Australia, Radio Australia	6080pa 7240pa 9590pa
1400 1500		Bahrain, Radio Bahrain	6010me
1400 1500	DRM	Belgium, TDP Radio/Disco Palace	6015eu
1400 1500		Bhutan, Bhutan Broadcasting Service	6035as
1400 1500	Sat/Sun	Canada, CBC NQ SW Service	9625na
1400 1500		Canada, CFRX Toronto ON	6070na
1400 1500		Canada, CFVP Calgary AB	6030na
1400 1500		Canada, CKZN St Johns NF	6160na
1400 1500		Canada, CKZU Vancouver BC	6160na
1400 1500		China, China Radio International	5955as 9765as 9870as 11665as 11675as 11765eu 13710as 13740na 13790eu 17630as
1400 1500	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
1400 1500		India, All India Radio	9690as 11620as 13710as
1400 1500		Malaysia, RTM/Traxx FM	7295do
1400 1500		Netherlands, R Netherlands Worldwide	11835as 15745as
1400 1500		New Zealand, Radio NZ International	6170pa
1400 1500		Nigeria, Voice of Nigeria/External Service	9690af
1400 1500		Palau, T8WH/WHRI/Sound of Hope Radio	9930as
1400 1500		Papua New Guinea, Radio Wantok Light	7325do
1400 1500		Russia, Voice of Russia	4975va 9455as 11500as
1400 1500	DRM	Russia, Voice of Russia	9750eu
1400 1500		South Africa, Channel Africa	9625af
1400 1500		Uganda, UBC Radio	4976do
1400 1500		UK, BBC World Service	5790eu 5875as 6190af 6195as 7230af 9740as 11920as 12095as 15310as 17640af 17830af 21470af
1400 1500	DRM	UK, BBC World Service	9545eu 13590eu
1400 1500	Sat	UK, Bible Voice Broadcasting	15265as
1400 1500		United States, Overcomer Ministries	13810eu
1400 1500		USA, American Forces Network	4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1400 1500		USA, KJES Vado NM	11715am
1400 1500		USA, KNLS Anchor Point AK	11765as
1400 1500		USA, Voice of America	6080af 12080af 15530af 15580af 17585af 17740af 7540va 7575va
1400 1500	mtwhf	USA, Voice of America	9760va
1400 1500		USA, WBCQ Monticello ME	9330am
1400 1500	Sat	USA, WBCQ Monticello ME	15420am
1400 1500		USA, WEWN Vandiver AL	13835as
1400 1500	Sat	USA, WHRI Cypress Creek SC	9840na
1400 1500		USA, WINB Red Lion PA	9265ca
1400 1500		USA, WJHR International Milton FL	15550na
1400 1500		USA, WRMI Miami FL	9955ca
1400 1500		USA, WTJC Newport NC	9370na
1400 1500		USA, WTWV Lebanon TN	9479na
1400 1500		USA, WWCR Nashville TN	7490af 9980na 13845na 15825na
1400 1500		USA, WWRB Manchester TN	9385na
1400 1500		USA, WYFR/Family Radio Worldwide	9365as 9615as 9865as 11560as 11725as 11830na 11910na 13695na 17795na
1400 1500		Zambia, 1 Africa-CVC Africa	13590af
1400 1500	vl	Zambia, Radio Christian Voice/The Voice Africa	6065af
1415 1430	mtwhfa	Germany, Pan American Broadcasting	15205as
1415 1430		Nepal, Radio Nepal	5005as
1415 1500	Sun	UK, Bible Voice Broadcasting	15265as
1425 1455	mtwhf	Swaziland, TWR Swaziland	6065af
1430 1445	Sun	Germany, Pan American Broadcasting	15205as
1430 1459		China, CNR-2/Business Radio	6055do 6155do 7245as 7315as 7335as 7375as 9820as
1430 1500	mtwhfa	Albania, Radio Tirana	13625na
1430 1500		Australia, Radio Australia	9475as 11660as
1430 1500		China, China Radio International	7325as 11695as 12110as
1430 1500		Sweden, Radio Sweden	13820va
1445 1500	Sat/Sun	Australia, HCJB Global Voice Australia	15340as

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500 1510	mtwhfa	Turkmenistan, Turkmen Radiosi	5015eu
1500 1515	Sun	UK, Bible Voice Broadcasting	13740as
1500 1530		Australia, HCJB Global Voice Australia	15340as
1500 1530	Sun	China, Voice of the Strait	4940do 9505do
1500 1530		Guam, KSDA/AWR	11720as
1500 1530		UK, BBC World Service	7405af 11860af 15420af
1500 1530		Vietnam, Voice of Vietnam	7285as 9840as 12020as
1500 1545		USA, WYFR/Family Radio Worldwide	15770sa
1500 1550		New Zealand, Radio NZ International	6170pa
1500 1557		Canada, Radio Canada International	11675as 15125as
1500 1557		Netherlands, R Netherlands Worldwide	11835as 15745as
1500 1557		North Korea, Voice of Korea	9335eu 11710na 13760na 15245eu
1500 1600		Anguilla, Worldwide Univ Network	11775am
1500 1600		Australia, ABC NT Alice Springs	2310do
1500 1600		Australia, ABC NT Katherine	2485do
1500 1600		Australia, Radio Australia	5995pa 6080pa 7240pa 9475as 9590pa 11660as
1500 1600		Bahrain, Radio Bahrain	6010me
1500 1600	Sat/Sun	Canada, CBC NQ SW Service	9625na
1500 1600		Canada, CFRX Toronto ON	6070na
1500 1600		Canada, CFVP Calgary AB	6030na
1500 1600		Canada, CKZN St Johns NF	6160na
1500 1600		Canada, CKZU Vancouver BC	6160na
1500 1600		China, China Radio International	5955as 6095me 7325as 7410as 9720me 9870as 9800as 11965eu 13640eu 13740na 17630as
1500 1600	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
1500 1600		Malaysia, RTM/Traxx FM	7295do
1500 1600		Myanmar, Myanma Radio	5985as
1500 1600		Nigeria, Voice of Nigeria/External Service	15120af
1500 1600		Papua New Guinea, Radio Wantok Light	7325do
1500 1600		Russia, Voice of Russia	4975va 9455as 9735me 11985va 12040eu 13855af 11985af
1500 1600		South Africa, Channel Africa	9625af
1500 1600	vl	Uganda, Dunamis Shortwave	4750af
1500 1600		Uganda, UBC Radio	4976do
1500 1600		UK, BBC World Service	5790eu 5875as 6575as 6190af 6195as 7230af 9740as 11920as 12095eu 15310as 15400af 17640af 17830af 21470af
1500 1600	DRM	UK, BBC World Service	5790eu 13590eu
1500 1600		United States, Overcomer Ministries	13810af 17485af
1500 1600		USA, American Forces Network	4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1500 1600		USA, Voice of America	4930af 7540va 7575va 12080af 12150va 13750va 15530va 15580af 17895af
1500 1600		USA, Voice of America/Special English	6140va 7520va 9485va 9760va
1500 1600		USA, WBCQ Monticello ME	9330am
1500 1600	Sat	USA, WBCQ Monticello ME	15420am
1500 1600		USA, WEWN Vandiver AL	13835as
1500 1600	Sat	USA, WHRI Cypress Creek SC	17510af
1500 1600	Sun	USA, WHRI Cypress Creek SC	9840na 15195eu
1500 1600	smtwhf	USA, WINB Red Lion PA	13570ca
1500 1600	Sat	USA, WINB Red Lion PA	9265ca
1500 1600		USA, WJHR International Milton FL	15550na
1500 1600		USA, WRMI Miami FL	9955na
1500 1600		USA, WTJC Newport NC	9370na
1500 1600		USA, WTWV Lebanon TN	9479na
1500 1600		USA, WWCR Nashville TN	7490af 9980na 13845na 15825na
1500 1600		USA, WWRB Manchester TN	9385na
1500 1600		USA, WYFR/Family Radio Worldwide	6280as 11605as 11830na 11910na 15520na 17580af 17795na
1500 1600		Zambia, 1 Africa-CVC Africa	13590af
1500 1600	vl	Zambia, Radio Christian Voice/The Voice Africa	6065af
1505 1600	DRM	Canada, Radio Canada International	9800na
1505 1600		Canada, Radio Canada International	9515as
1515 1530		Vatican City State, Vatican Radio	11850as 13765as 15235as
1515 1545	Sat	UK, Bible Voice Broadcasting	13740as

1525	1600	Sat/Sun	Swaziland, TWR Swaziland	6025af	
1530	1545		India, All India Radio	7255do	9820do
			9910do		
1530	1558	Sat	Vatican City State, Vatican Radio	11850as	
			13765as	15235as	
1530	1600		China, Xizang PBS/Holy Tibet	4905do	4920do
			5240do	6110do	6130do
			7255do	7385do	6200do
1530	1600		Germany, AWR Europe	15255as	
1530	1600		Iran, VOIRI/IRIB	7305as	9600as
1530	1600		Mongolia, Voice of Mongolia	9665as	12085as
1530	1600		Sweden, Radio Sweden	13870va	13600al
1530	1600	h	UK, Bible Voice Broadcasting	13740as	
1530	1600	Sun	UK, Bible Voice Broadcasting	13590me	
1545	1600	m	UK, Bible Voice Broadcasting	13590me	
1545	1600	twhfa	UK, Bible Voice Broadcasting	13590me	
1551	1600		New Zealand, Radio NZ International	7440pa	
1551	1600	DRM	New Zealand, Radio NZ International	6170pa	

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1605	Sun	Croatia, Croatian Radio	6165eu	
1600	1615	mtwhfa	Croatia, Croatian Radio	6165eu	
1600	1615		Pakistan, PBC/Radio Pakistan	7530me	11565af
			11585va		
1600	1615	f	UK, Bible Voice Broadcasting	13590me	
1600	1625	Sat/Sun	Swaziland, TWR Swaziland	6025af	
1600	1627		Czech Republic, Radio Prague		9740eu
1600	1627		Iran, VOIRI/IRIB	7305as	9600as
1600	1630	Sun	Germany, Pan American Broadcasting		13830me
1600	1630		Guam, KSDA/AWR	11720as	11805as
1600	1630		Myanmar, Myanmar Radio	9730do	
1600	1630		Vietnam, Voice of Vietnam	7220me	7280eu
			9550me	9730eu	
1600	1645	h	UK, Bible Voice Broadcasting	13590me	
1600	1645		USA, WYFR/Family Radio Worldwide		11830na
			11865na		
1600	1657		North Korea, Voice of Korea	9990na	11545va
1600	1700		Anguilla, Worldwide Univ Network		11775am
1600	1700		Australia, ABC NT Alice Springs		2310do
1600	1700		Australia, ABC NT Katherine	2485do	
1600	1700		Australia, Radio Australia	5995pa	6080pa
			7240pa	9465as	9710pa
					11660as
1600	1700		Bahrain, Radio Bahrain	6010me	
1600	1700	Sat	Canada, CBC NQ SW Service		9625na
1600	1700		Canada, CFRX Toronto ON	6070na	
1600	1700		Canada, CFVP Calgary AB	6030na	
1600	1700		Canada, CKZN St Johns NF	6160na	
1600	1700		Canada, CKZU Vancouver BC		6160na
1600	1700		Canada, Radio Canada International	9515as	
1600	1700	DRM	Canada, Radio Canada International	9800na	
1600	1700		China, China Radio International	6060as	
			7235as	7420af	9570af
			11940eu	11965eu	13760eu
1600	1700		Egypt, Radio Cairo		12170af
1600	1700		Ethiopia, Radio Ethiopia/External Service	7165va	
			9560af		
1600	1700	mtwhf	France, Radio France Internationale		15605af
			17605af		
1600	1700		Germany, Deutsche Welle	6170as	9485as
			9540as	15410as	
1600	1700		Malaysia, RTM/Traxx FM	7295do	
1600	1700		New Zealand, Radio NZ International		7440pa
1600	1700	DRM	New Zealand, Radio NZ International		6170pa
1600	1700		Papua New Guinea, Radio Wantok Light	7325do	
1600	1700		Russia, Voice of Russia	4975va	11985va
			11985af	12040eu	13855af
1600	1700		South Korea, KBS World Radio		9515eu
1600	1700		Taiwan, Radio Taiwan International		11550as
			13840as		
1600	1700	vl	Uganda, Dunamis Shortwave	4750af	
1600	1700		Uganda, UBC Radio	4976do	
1600	1700		UK, BBC World Service	3255af	5790eu
			5850as	5975as	6190af
			12095eu	15400af	17640af
			17830af	21470af	17795af
1600	1700	DRM	UK, BBC World Service	3995eu	5790eu
1600	1700	Sat/Sun	UK, Bible Voice Broadcasting	13590me	
1600	1700		USA, American Forces Network		4319usb
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
1600	1700		USA, Voice of America	4930af	6080af
			15580af		
1600	1700		USA, Voice of America/Special English		11890va
			12080va	13570va	
1600	1700		USA, WBCQ Monticello ME	9330am	
1600	1700	Sat	USA, WBCQ Monticello ME	15420am	

1600	1700		USA, WEWN Vandiver AL	15610va	
1600	1700	Sun	USA, WHRI Cypress Creek SC		9840na
1600	1700	has	USA, WHRI Cypress Creek SC		17520af
1600	1700	smtwhf	USA, WINB Red Lion PA	13570ca	
1600	1700	Sat	USA, WINB Red Lion PA	9265ca	
1600	1700		USA, WJHR International Milton FL		15550na
1600	1700		USA, WRMI Miami FL	9955na	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WTWW Lebanon TN	9479na	
1600	1700		USA, WWCN Nashville TN	9980na	12160af
			13845na	15825na	
1600	1700		USA, WWRB Manchester TN	9385na	
1600	1700		USA, WYFR/Family Radio Worldwide		6010af
			6085ca	7270af	11850as
			17545af	17795na	18980va
			21525af		21485eu
1600	1700		Zambia, 1 Africa-CVC Africa	13590af	
1600	1700	vl	Zambia, Radio Christian Voice/The Voice Africa		
			6065af		
1615	1630	mtwhf	Swaziland, TWR Swaziland	6130af	
1615	1630		Vatican City State, Vatican Radio		4005eu
			5885eu	7250eu	15595eu
1615	1700	Sun	UK, BBC World Service	7405af	11860af
			15420af		
1630	1700		Guam, KSDA/AWR		11740as
1630	1700		Palau, T8WH/WHRI/Sound of Hope Radio		
			9930va		
1630	1700		Slovakia, Radio Slovakia International		5920eu
			6055eu		
1630	1700	Sat/Sun	Swaziland, TWR Swaziland	6130af	
1630	1700	Sat	UK, BBC World Service		11860af
1630	1700	mtwhf	UK, BBC World Service		15420af
1640	1650	mtwhfa	Turkmenistan, Turkmen Radiosi		4930eu

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1705		Canada, Radio Canada International	9515as	
1700	1705	DRM	Canada, Radio Canada International		9800na
1700	1715	mtwhf	Moldova, (Transnistria) Radio PMR		6240eu
1700	1715		UK, Bible Voice Broadcasting	13590me	
1700	1727		Czech Republic, Radio Prague		9740eu
1700	1730	DRM	Romania, Radio Romania International		7350eu
1700	1730		Sweden, Radio Sweden	13870va	
1700	1730		USA, Voice of America	6080af	12015af
			15580af	17895af	
1700	1730		Vietnam, Voice of Vietnam	9725eu	
1700	1746		UK, BBC World Service	6005af	9410af
1700	1756	DRM	Romania, Radio Romania International		9535eu
1700	1756		Romania, Radio Romania International		11735eu
1700	1759		Canada, Radio Canada International		5850na
1700	1759		Poland, Polskie Radio Warsaw		9770eu
1700	1800		Anguilla, Worldwide Univ Network		11775am
1700	1800		Australia, ABC NT Alice Springs		2310do
1700	1800		Australia, ABC NT Katherine	2485do	
1700	1800		Australia, Radio Australia	5995pa	6080pa
			9475as	9510pa	9710pa
					11880pa
1700	1800		Bahrain, Radio Bahrain	6010me	
1700	1800	Sat	Canada, CBC NQ SW Service		9625na
1700	1800		Canada, CFRX Toronto ON	6070na	
1700	1800		Canada, CFVP Calgary AB	6030na	
1700	1800		Canada, CKZN St Johns NF	6160na	
1700	1800		Canada, CKZU Vancouver BC		6160na
1700	1800		China, China Radio International		6090as
			6140as	6145eu	6165me
			7265af	7410as	7420as
			9695eu	11900af	13760eu
1700	1800		Egypt, Radio Cairo		12170af
1700	1800		Equatorial Guinea, Radio Africa		7190af
			15190af		
1700	1800	DRM	Germany, Deutsche Welle	5790eu	
1700	1800		Malaysia, RTM/Traxx FM	7295do	
1700	1800		New Zealand, Radio NZ International		7440pa
1700	1800	DRM	New Zealand, Radio NZ International		6170pa
1700	1800		Nigeria, Voice of Nigeria/External Service		15120af
1700	1800		Palau, T8WH/WHRI/Sound of Hope Radio		
			9930va		
1700	1800		Papua New Guinea, Radio Wantok Light	7325do	
1700	1800	DRM	Poland, Polskie Radio Warsaw		7265eu
1700	1800		Russia, Voice of Russia	4975va	11985va
			12040eu	13855af	
1700	1800		South Africa, Channel Africa	9675af	
1700	1800		Swaziland, TWR Swaziland	3200af	9500af
1700	1800		Taiwan, Radio Taiwan International		15690af
1700	1800		Tajikistan, Voice of Tajik/External Service		7245va
1700	1800	vl	Uganda, Dunamis Shortwave	4750af	
1700	1800		Uganda, UBC Radio		4976do

1700	1800		UK, BBC World Service	3255af	5790eu
			5850as	5875eu	5975as
			7405af	9810as	12095af
			15400af	17795af	17830af
1700	1800	DRM	UK, BBC World Service	3995eu	
1700	1800	Sat	UK, Bible Voice Broadcasting	9645me	
1700	1800	Sat/Sun	UK, Bible Voice Broadcasting	13590me	
1700	1800		USA, American Forces Network	4319usb	
			5446usb	5765usb	7812usb
			12759usb	13362usb	
1700	1800		USA, WBCQ Monticello ME	9330am	15420am
1700	1800		USA, WEWN Vandiver AL	15610va	
1700	1800	smtwhf	USA, WINB Red Lion PA	13570ca	
1700	1800	Sat	USA, WINB Red Lion PA	9265ca	
1700	1800		USA, WJHR International Milton FL	15550na	
1700	1800		USA, WRMI Miami FL	9955ca	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WTWV Lebanon TN	9479na	
1700	1800		USA, WWCN Nashville TN	9980na	12160af
			13845na	15825na	
1700	1800		USA, WWRB Manchester TN	9385na	
1700	1800		USA, WYFR/Family Radio Worldwide	7395af	
			7560af	11810af	13690na
			17795na	18980va	21485eu
1700	1800		Zambia, 1 Africa-CVC Africa	13590af	
1720	1740	Sat/Sun	USA, Voice of America/Studio 7	4930af	
			11605af	15775af	
1730	1740		USA, Voice of America	4930af	11605af
			15775af		
1730	1800		Bulgaria, Radio Bulgaria	5900eu	7400eu
1730	1800	DRM	Bulgaria, Radio Bulgaria	9400eu	
1730	1800		Clandestine, Sudan Radio Service/ SRS	9590af	
1730	1800		UK, Bible Voice Broadcasting	13590me	
1730	1800	Sun	UK, Bible Voice Broadcasting	9645me	
1730	1800		USA, Voice of America	12015af	15580af
			17895af		
1730	1800	mtwhf	USA, Voice of America/Studio 7	4930af	
			11605af	15775af	
1730	1800		Vatican City State, Vatican Radio	11625af	
			13765af	15570af	
1745	1800		Bangladesh, Bangladesh Betar	7250as	
1745	1800	DRM	India, All India Radio	9950eu	
1745	1800		India, All India Radio	6120eu	6280eu
			7400af	7410af	7550eu
			9445af	9940eu	11935af
1745	1800	mtwhf	Moldova, (Transnistria) Radio PMR	6240na	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1800	Sat	USA, WINB Red Lion PA	9265ca	
1800	1810	Sun	UK, Bible Voice Broadcasting	13590me	
1800	1830	w	Austria, AWR Europe	9755af	
1800	1830		South Africa, AWR3215af	3345af	9610af
1800	1830		UK, BBC World Service	5875as	5975as
1800	1830	Sun	UK, Bible Voice Broadcasting	9430me	
1800	1830		USA, Voice of America	6080af	9850af
			12015af	15580af	
1800	1830	Sat/Sun	USA, Voice of America	4930af	
1800	1835		New Zealand, Radio NZ International	7440pa	
1800	1835	DRM	New Zealand, Radio NZ International	6170pa	
1800	1857		Netherlands, R Netherlands Worldwide	6020af	
1800	1857		North Korea, Voice of Korea	13760af	15245eu
1800	1859		Canada, Radio Canada International	9530af	
			11765af	17735af	17810af
1800	1900		Anguilla, Worldwide Univ Network	11775am	
1800	1900	mtwhf	Argentina, Radio Nacional RAE	9690eu	
			15345eu		
1800	1900		Australia, ABC NT Alice Springs	2310do	
1800	1900		Australia, ABC NT Katherine	2485do	
1800	1900		Australia, Radio Australia	6080pa	7240pa
			9475as	9510pa	11880pa
1800	1900		Bahrain, Radio Bahrain	6010me	
1800	1900		Bangladesh, Bangladesh Betar	7250eu	
1800	1900		Canada, CFRX Toronto ON	6070na	
1800	1900		Canada, CFVP Calgary AB	6030na	
1800	1900		Canada, CKZN St Johns NF	6160na	
1800	1900		Canada, CKZU Vancouver BC	6160na	
1800	1900		China, China Radio International	9600eu	
			13760eu		
1800	1900		Equatorial Guinea, Radio Africa	7190af	
			15190af		
1800	1900	DRM	Germany, Deutsche Welle	5790eu	
1800	1900	DRM	India, All India Radio	9950eu	
1800	1900		India, All India Radio	6120af	6280eu
			7400af	7410af	7550eu
			9445af	11935af	
1800	1900		Kuwait, Radio Kuwait	15540va	

1800	1900		Liberia, Star Radio	3900do	4025al
1800	1900		Malaysia, RTM/Traxx FM	7295do	
1800	1900		Netherlands, R Netherlands Worldwide	12045af	
			15535af		
1800	1900		Nigeria, Voice of Nigeria/External Service	15120af	
1800	1900		Palau, T8WH/WHRI/Sound of Hope Radio	9930va	9955as
1800	1900		Papua New Guinea, Radio Wantok Light	7325do	
1800	1900		Russia, Voice of Russia	4975va	12040eu
1800	1900		South Korea, KBS World Radio	7275eu	
1800	1900		Taiwan, Radio Taiwan International	6155eu	
1800	1900	vl	Uganda, Dunamis Shortwave	4750af	
1800	1900		Uganda, UBC Radio	4976do	
1800	1900		UK, BBC World Service	3255af	5790eu
			5875eu	5950as	6190af
			11810af	12095af	13675af
			17795af		15400af
1800	1900	Sat	UK, Bible Voice Broadcasting	9430me	
1800	1900	Sun	UK, Bible Voice Broadcasting	6130eu	
1800	1900		USA, American Forces Network	4319usb	
			5446usb	5765usb	7812usb
			12759usb	13362usb	
1800	1900		USA, KJES Vado NM	15385pa	
1800	1900		USA, WBCQ Monticello ME	7415am	9330am
			15420am		
1800	1900		USA, WEWN Vandiver AL	15610va	
1800	1900	Sun	USA, WHRI Cypress Creek SC	17520af	
1800	1900	hf	USA, WHRI Cypress Creek SC	9840na	
1800	1900	smtwhf	USA, WINB Red Lion PA	13570ca	
1800	1900		USA, WJHR International Milton FL	15550na	
1800	1900		USA, WRMI Miami FL	9955ca	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WTWV Lebanon TN	9479na	
1800	1900		USA, WWCN Nashville TN	9980na	12160af
			13845na	15825na	
1800	1900		USA, WWRB Manchester TN	9385na	
1800	1900		USA, WYFR/Family Radio Worldwide	6180af	
			7395af	9770af	9830me
			13690na	13750af	17795na
			18980va		17845af
1800	1900		Yemen, Republic of Yemen Radio/Radio Sana'a	6005me	9780me
1800	1900		Zambia, 1 Africa-CVC Africa	13590af	
1805	1810	Sat	Croatia, Croatian Radio	6165eu	
1805	1815	mtwhf	Croatia, Croatian Radio	6165eu	
1810	1820	f	USA, Voice of America	4930af	11605af
			15775af		
1830	1845		Rwanda, Radio Rwanda	6055do	
1830	1845	Sat	UK, Bible Voice Broadcasting	6130eu	
1830	1900		Serbia, International Radio of Serbia	6100eu	
1830	1900		Slovakia, Radio Slovakia International	5920eu	
			6055eu		
1830	1900		Turkey, Voice of Turkey	9785eu	
1830	1900		UK, BBC World Service	5875as	6005af
			9410af		
1830	1900	f	UK, Bible Voice Broadcasting	9430me	
1830	1900		USA, Voice of America	4930af	6080af
			9850af	12015af	15580af
1836	1900		New Zealand, Radio NZ International	9615pa	
1836	1900	DRM	New Zealand, Radio NZ International	9890pa	
1845	1900	mtwhas	Albania, Radio Tirana	7520eu	13640na
1845	1900	Sun	UK, Bible Voice Broadcasting	11830af	
1859	1900		Netherlands, R Netherlands Worldwide	7425af	
			11610af	11970af	

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915	Sun	UK, Bible Voice Broadcasting	11830af	
1900	1930		Germany, Deutsche Welle	6150af	11795af
			17865af		
1900	1930		Turkey, Voice of Turkey	9785eu	
1900	1930		Vietnam, Voice of Vietnam	7280eu	9730eu
1900	1935	DRM	New Zealand, Radio NZ International	9890pa	
1900	1945	DRM	India, All India Radio	9950eu	
1900	1945		India, All India Radio	6120af	6280eu
			7400af	7410af	7550eu
			9445af	11935af	
1900	1945	mtwh	USA, WBCQ Monticello ME	7415am	
1900	1945		USA, WYFR/Family Radio Worldwide	6085ca	
1900	1950		New Zealand, Radio NZ International	9615pa	
1900	1957		Netherlands, R Netherlands Worldwide	7425af	
			12045af	15535af	
1900	1957		North Korea, Voice of Korea	7100eu	9975af
			11535va	11910af	
1900	2000		Anguilla, Worldwide Univ Network	11775am	
1900	2000		Australia, ABC NT Alice Springs	2310do	

1900	2000		Australia, ABC NT Katherine	2485do	
1900	2000		Australia, Radio Australia	6080pa	7240pa
			9500as	9510pa	11880pa
1900	2000		Bahrain, Radio Bahrain	6010me	
1900	2000	DRM	Belgium, TDP Radio	15755na	
1900	2000		Canada, CFRX Toronto ON	6070na	
1900	2000		Canada, CFVP Calgary AB	6030na	
1900	2000		Canada, CKZN St Johns NF	6160na	
1900	2000		Canada, CKZU Vancouver BC		6160na
1900	2000		China, China Radio International		7295af
			9435af		
1900	2000		Egypt, Radio Cairo	11510af	
1900	2000		Equatorial Guinea, Radio Africa		7190af
			15190af		
1900	2000	DRM	Germany, Deutsche Welle	3995eu	5875eu
1900	2000		Kuwait, Radio Kuwait	15540va	17550va
1900	2000		Liberia, Star Radio	3900do	4025al
1900	2000		Malaysia, RTM/Traxx FM	7295do	
1900	2000		Netherlands, R Netherlands Worldwide		11610af
			11970af		
1900	2000		Nigeria, Voice of Nigeria/External Service		
			9690af	7255al	
1900	2000		Palau, T8WH/WHRI/Sound of Hope Radio		
			9930va		
1900	2000		Papua New Guinea, Radio Wantok Light	7325do	
1900	2000		Russia, Voice of Russia	12040eu	
1900	2000	mtwhf	Spain, Radio Exterior de Espana		9665af
			11620eu		
1900	2000		Thailand, Radio Thailand World Service	7570eu	
1900	2000		Uganda, UBC Radio	4976do	
1900	2000		UK, BBC World Service	3255af	3995eu
			5875eu	5950as	6005af
			6190af	9410af	11810af
			15400af	17795af	12095af
1900	2000		Ukraine, Radio Ukraine International		7440na
1900	2000		United States, Overcomer Ministries		6155eu
			7425me	9895me	
1900	2000		USA, American Forces Network		4319usb
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
1900	2000		USA, Voice of America	4930af	4940af
			6080af	9850af	15580af
					17895af
1900	2000		USA, Voice of America/Special English		7485va
			9630va		
1900	2000	fas	USA, WBCQ Monticello ME	7415am	
1900	2000		USA, WBCQ Monticello ME	9330am	15420am
1900	2000		USA, WEWN Vandiver AL	15610va	
1900	2000	mtwhfa	USA, WHRI Cypress Creek SC		9840na
1900	2000	Sun	USA, WHRI Cypress Creek SC		15665af
1900	2000	smtwhf	USA, WINB Red Lion PA	13570ca	
1900	2000	Sat	USA, WINB Red Lion PA	9265ca	
1900	2000		USA, WJHR International Milton FL		15550na
1900	2000		USA, WRMI Miami FL	9955ca	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WTWW Lebanon TN	9479na	
1900	2000		USA, WWCR Nashville TN	9980na	12160af
			13845na	15825na	
1900	2000		USA, WWRB Manchester TN	9385na	
1900	2000		USA, WYFR/Family Radio Worldwide		3230af
			6020af	7270af	7395af
			9775af	9830me	13615af
			17795na	17845af	18930va
					18980va
1900	2000		Zambia, 1 Africa-CVC Africa	9540af	
1905	1920	Sat	Mali, ORTM Du Mali	5995do	
1905	2000	m	South Africa, Amateur Radio Mirror Intl		3215af
1930	2000	Sat/Sun	Germany, Pan American Broadcasting		6175af
1930	2000		Iran, VOIRI/IRIB	5940eu	6205eu
			7215af	9800af	7205eu
1930	2000	vi	South Africa, RTE Radio Worldwide		6225af
1936	2000	DRM	New Zealand, Radio NZ International		11675pa
1945	2000	DRM	Vatican City State, Vatican Radio		9800am
1950	2000		Vatican City State, Vatican Radio		4005eu
			5885eu	7250eu	9645eu
1951	2000		New Zealand, Radio NZ International		11725pa

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2005	m	South Africa, Amateur Radio Mirror Intl	3215af	
2000	2015	Sun	Germany, Pan American Broadcasting	6175af	
2000	2020		Vatican City State, Vatican Radio		4005eu
			5885eu	7250eu	9645eu
2000	2027		Czech Republic, Radio Prague		5930eu
2000	2027		Iran, VOIRI/IRIB	5940eu	6205eu
			7215af	9800af	
2000	2030	mtwhfa	Albania, Radio Tirana	7465eu	13640na
2000	2030		Egypt, Radio Cairo	11510af	
2000	2030	Sat	Germany, Pan American Broadcasting		6175af

2000	2030	vi	South Africa, RTE Radio Worldwide		6225af
2000	2030		Swaziland, TWR Swaziland	3200af	
2000	2030		USA, Voice of America	4930af	4940af
			6080af	15580af	
2000	2030		Vatican City State, Vatican Radio		7365af
			9755af	11625af	
2000	2030	DRM	Vatican City State, Vatican Radio		9800am
2000	2045		USA, WYFR/Family Radio Worldwide		17750eu
2000	2050	DRM	New Zealand, Radio NZ International		11675pa
2000	2056		Romania, Radio Romania International		9690na
			11880eu	11940na	
2000	2057		Germany, Deutsche Welle	6150af	11795af
			11865af		
2000	2057		Netherlands, R Netherlands Worldwide		7425af
			11610af	11970af	
2000	2059		Canada, Radio Canada International		15235af
			17735af		
2000	2100		Anguilla, Worldwide Univ Network		11775am
2000	2100		Australia, ABC NT Alice Springs		2310do
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek		2325do
2000	2100		Australia, Radio Australia	6080pa	11650pa
			11660pa	11880pa	
2000	2100	Sat/Sun	Australia, Radio Australia	6080pa	7240pa
			12080pa		
2000	2100		Bahrain, Radio Bahrain	6010me	
2000	2100		Belarus, Radio Belarus	7255eu	7360eu
			7390eu		
2000	2100	DRM	Belgium, TDP Radio/Disco Palace		15755na
2000	2100		Canada, CFRX Toronto ON	6070na	
2000	2100		Canada, CFVP Calgary AB	6030na	
2000	2100		Canada, CKZN St Johns NF	6160na	
2000	2100		Canada, CKZU Vancouver BC		6160na
2000	2100		China, China Radio International		5960eu
			5985af	7285eu	7295af
			9440af	9600eu	7415eu
2000	2100		Cuba, Radio Havana Cuba	11760ca	
2000	2100		Equatorial Guinea, Radio Africa		7190af
			15190af		
2000	2100		Indonesia, Voice of Indonesia	9526va	11785al
2000	2100		Kuwait, Radio Kuwait	15540va	17550va
2000	2100		Liberia, Star Radio	3900do	4025al
2000	2100		Malaysia, RTM/Traxx FM	7295do	
2000	2100		New Zealand, Radio NZ International		11725pa
2000	2100		Nigeria, Voice of Nigeria/External Service		
			15120af		
2000	2100		Palau, T8WH/WHRI/Sound of Hope Radio		
			9930va		
2000	2100		Syria, Radio Damascus	9330eu	12085as
2000	2100		Uganda, UBC Radio	4976do	
2000	2100		Uganda, UBC Radio	4976do	
2000	2100		UK, BBC World Service	3255af	5875eu
			6005af	6190af	9410af
			12095af	13820af	15400af
2000	2100		United States, Overcomer Ministries		6155eu
2000	2100		USA, American Forces Network		4319usb
			5446usb	5765usb	7812usb
			12759usb	13362usb	12133usb
2000	2100		USA, WBCQ Monticello ME	7415am	9330am
			15420am		
2000	2100		USA, WEWN Vandiver AL	15610va	
2000	2100	Sat	USA, WHRI Cypress Creek SC		15665af
2000	2100	Sun	USA, WHRI Cypress Creek SC		13660af
2000	2100	smtwhf	USA, WINB Red Lion PA	13570ca	
2000	2100	Sat	USA, WINB Red Lion PA	9265ca	
2000	2100		USA, WJHR International Milton FL		15550na
2000	2100		USA, WRMI Miami FL	9955ca	
2000	2100		USA, WTJC Newport NC	9370na	
2000	2100		USA, WTWW Lebanon TN	9479na	
2000	2100		USA, WWCR Nashville TN	9980na	12160af
			13845na	15825na	
2000	2100		USA, WWRB Manchester TN	9385na	
2000	2100		USA, WYFR/Family Radio Worldwide		5975af
			7430eu	9450af	9510af
			9740af	11690af	12055af
			17725af	17795va	17845va
					18980va
2000	2100		Zambia, 1 Africa-CVC Africa	9540af	
2030	2045		Thailand, Radio Thailand World Service		9680eu
2030	2056	DRM	Romania, Radio Romania International		9765eu
2030	2100		Sweden, Radio Sweden	9495va	
2030	2100		Turkey, Voice of Turkey	7205va	
2030	2100		USA, Voice of America	4930af	6080af
			7355af	7555af	15580af
2030	2100	Sat/Sun	USA, Voice of America		4940af
2030	2100		Vietnam, Voice of Vietnam	7280eu	9550me
2045	2100		India, All India Radio	6280eu	7550eu
			9445eu	9910pa	11620pa
2045	2100	DRM	India, All India Radio		9950eu

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100 2105		Uganda, UBC Radio	4976do	
2100 2130		Australia, ABC NT Alice Springs	2310do	
2100 2130		Australia, ABC NT Alice Springs	2310do	
2100 2130		Australia, ABC NT Katherine	2485do	
2100 2130		Australia, ABC NT Tennant Creek	2325do	
2100 2130		Austria, AWR Europe	11955af	
2100 2130	Sat	Canada, CBC NQ SW Service	9625na	
2100 2130		Serbia, International Radio of Serbia	6100eu	
2100 2130		South Korea, KBS World Radio	3955eu	
2100 2130		Turkey, Voice of Turkey	7205va	
2100 2145		USA, WYFR/Family Radio Worldwide	13615na	
		13690na	17795na	18980va
2100 2150		New Zealand, Radio NZ International	11725pa	
2100 2150	DRM	New Zealand, Radio NZ International	11675pa	
2100 2157		Germany, Deutsche Welle	9735as	11865af
		15640af		
2100 2157		North Korea, Voice of Korea	13760va	15245eu
2100 2200		Anguilla, Worldwide Univ Network	11775am	
2100 2200		Australia, Radio Australia	9500as	9660pa
		11650pa	11660pa	11695as
		13630pa	15515pa	12080pa
2100 2200		Bahrain, Radio Bahrain	6010me	
2100 2200		Belarus, Radio Belarus	7255eu	7360as
		7390eu		
2100 2200		Bulgaria, Radio Bulgaria	5900eu	7400eu
2100 2200		Canada, CFRX Toronto ON	6070na	
2100 2200		Canada, CFVP Calgary AB	6030na	
2100 2200		Canada, CKZN St Johns NF	6160na	
2100 2200		Canada, CKZU Vancouver BC	6160na	
2100 2200	DRM	Canada, Radio Canada International	9800na	
2100 2200		China, China Radio International	5960eu	
		7205af	7285eu	7325af
		9600eu		7415eu
2100 2200		Equatorial Guinea, Radio Africa	7190af	
		15190af		
2100 2200		India, All India Radio	6280eu	7550eu
		9445eu	9910pa	11620pa
2100 2200	DRM	India, All India Radio	9950eu	
2100 2200		Malaysia, RTM/Traxx FM	7295do	
2100 2200		Palau, T8WH/WHRI/Sound of Hope Radio	9930va	
2100 2200	Sat/Sun	Spain, Radio Exterior de Espana	9650eu	
2100 2200		Syria, Radio Damascus	9330va	12085va
2100 2200	DRM	UK, BBC World Service	3995eu	
2100 2200		UK, BBC World Service	3255af	3915as
		5790eu	5875as	5905as
		6190af	6195as	7405af
		12095af		9915af
2100 2200		Ukraine, Radio Ukraine International	6145na	
2100 2200		USA, American Forces Network	4319usb	
		5446usb	5765usb	7812usb
		12759usb	13362usb	12133usb
2100 2200		USA, Voice of America	6080af	7555af
		15580af		
2100 2200		USA, WBCQ Monticello ME	7415am	9330am
2100 2200		USA, WEWN Vandiver AL	15610va	
2100 2200	Sun	USA, WHRI Cypress Creek SC	9690na	
2100 2200	Sat	USA, WHRI Cypress Creek SC	13660af	
2100 2200		USA, WINB Red Lion PA	9265ca	
2100 2200		USA, WJHR International Milton FL	15550na	
2100 2200		USA, WRMI Miami FL	9955ca	
2100 2200		USA, WTJC Newport NC	9370na	
2100 2200		USA, WTTW Lebanon TN	9479na	
2100 2200		USA, WWCN Nashville TN	7465na	9350na
		9980na	13845na	
2100 2200		USA, WWRB Manchester TN	3215na	6890va
2100 2200		USA, WYFR/Family Radio Worldwide	5975af	
		7425af	9450eu	9715af
		12055af	17845af	9740af
2100 2200		Zambia, 1 Africa-CVC Africa	9540af	
2115 2145		Egypt, Radio Cairo	6270eu	
2130 2157		Czech Republic, Radio Prague	9410af	
2130 2200		Australia, ABC NT Alice Springs	4835do	
2130 2200		Australia, ABC NT Katherine	5025do	
2130 2200	mtwhfa	Canada, CBC NQ SW Service	9625na	
2130 2200		China, China Radio International	7365eu	
2130 2200		Guam, KSDA/AWR	11850as	
2130 2200		Netherlands, R Netherlands Worldwide	7460af	
2130 2200		Sweden, Radio Sweden	7460va	

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200 2230		India, All India Radio	6280eu	7550eu
		9445eu	9910pa	11620pa
2200 2230	DRM	India, All India Radio	9950eu	
2200 2245		Egypt, Radio Cairo	6270eu	
2200 2245		USA, WYFR/Family Radio Worldwide		15770af
2200 2256		Romania, Radio Romania International	5960as	
		7435va	9790eu	11940as
2200 2300		Anguilla, Worldwide Univ Network		6090am
2200 2300		Australia, ABC NT Alice Springs		4835do
2200 2300		Australia, ABC NT Katherine	5025do	
2200 2300		Australia, Radio Australia	9660pa	11695as
		11875as	12080pa	13630pa
		15240as	15415as	15515pa
				15560pa
2200 2300		Bahrain, Radio Bahrain	6010me	
2200 2300	smtwhf	Canada, CBC NQ SW Service		9625na
2200 2300		Canada, CFRX Toronto ON	6070na	
2200 2300		Canada, CFVP Calgary AB	6030na	
2200 2300		Canada, CKZN St Johns NF	6160na	
2200 2300		Canada, CKZU Vancouver BC	6160na	
2200 2300		China, China Radio International	9590as	
2200 2300		Equatorial Guinea, Radio Africa	7190af	
		15190af		
2200 2300		Malaysia, RTM/Traxx FM	7295do	
2200 2300		New Zealand, Radio NZ International		13730pa
2200 2300	DRM	New Zealand, Radio NZ International		15720pa
2200 2300		Russia, Voice of Russia	9890na	
2200 2300		Syria, Radio Damascus	9330va	12085va
2200 2300		Turkey, Voice of Turkey	9830va	
2200 2300		UK, BBC World Service	3915as	5905as
		5935af	6195as	7490as
		9740as	9915af	12095af
2200 2300	DRM	UK, BBC World Service	3995eu	
2200 2300		USA, American Forces Network		4319usb
		5446usb	5765usb	7812usb
		12759usb	13362usb	12133usb
2200 2300	mtwhf	USA, Voice of America	5895va	5915va
		7460va	7575va	11955va
2200 2300		USA, Voice of America	7555af	
2200 2300	Sat/Sun	USA, WBCQ Monticello ME	5110am	
2200 2300		USA, WBCQ Monticello ME	7415am	9330am
2200 2300		USA, WEWN Vandiver AL	11520va	
2200 2300	f	USA, WHRI Cypress Creek SC		11785na
2200 2300	Sun	USA, WHRI Cypress Creek SC		9785af
2200 2300		USA, WINB Red Lion PA	9265ca	
2200 2300		USA, WJHR International Milton FL		15550na
2200 2300		USA, WRMI Miami FL	9955ca	
2200 2300		USA, WTJC Newport NC	9370na	
2200 2300		USA, WTTW Lebanon TN	9479na	
2200 2300		USA, WWCN Nashville TN	7465na	9350na
		9980na	13845na	
2200 2300		USA, WWRB Manchester TN	3215na	6890va
2200 2300		USA, WYFR/Family Radio Worldwide	5950na	
		11740na	15440na	
2215 2230		Croatia, Croatian Radio	3985eu	9925ca
2230 2257		Czech Republic, Radio Prague		9440na
2230 2300		China, Xizang PBS/Holy Tibet	4905do	4920do
		5240do	6110do	6130do
		7255do	7385do	6200do
2230 2300		Guam, KSDA/AWR	15320as	
2230 2300		USA, Voice of America	11840as	
2230 2300		USA, Voice of America/Special English		9570va
		11840va	15145va	
2245 2300		India, All India Radio	6055as	7305as
		9705as	9950as	11645as
				13605as

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300 0000		Anguilla, Worldwide Univ Network	6090am	
2300 0000		Australia, ABC NT Alice Springs	4835do	
2300 0000		Australia, ABC NT Katherine	5025do	
2300 0000		Australia, Radio Australia	9660pa	11875as
		12080pa	13690pa	15560pa
				17750as
2300 0000		Bahrain, Radio Bahrain	6010me	
2300 0000		Bulgaria, Radio Bulgaria	9700na	11700na
2300 0000	smtwhf	Canada, CBC NQ SW Service		9625na
2300 0000		Canada, CFRX Toronto ON	6070na	
2300 0000		Canada, CFVP Calgary AB	6030na	
2300 0000		Canada, CKZN St Johns NF	6160na	
2300 0000		Canada, CKZU Vancouver BC	6160na	
2300 0000		China, China Radio International	5915as	
		5990ca	6145na	7350eu
		9610as	11690pa	11790as
				11840na

2300 0000	Cuba, Radio Havana Cuba	5040na	
2300 0000	Egypt, Radio Cairo	11590na	
2300 0000 vl	Guyana, Voice of Guyana	3290va	
2300 0000	India, All India Radio	6055as 7305as	
	9705as 9950as	11645as 13605as	
2300 0000	Malaysia, RTM/Traxx FM	7295do	
2300 0000	New Zealand, Radio NZ International	13730pa	
2300 0000 DRM	New Zealand, Radio NZ International	15720pa	
2300 0000	Russia, Voice of Russia	9890na	
2300 0000	UK, BBC World Service	3915as 6195as	
	7490as 9740as	9890as 11850as	
	12010as		
2300 0000	USA, American Forces Network	4319usb	
	5446usb 5765usb	7812usb 12133usb	
	12759usb 13362usb		
2300 0000	USA, Voice of America	5895va 5915va	
	7575va 11955va	13805as	
2300 0000 Sat/Sun	USA, WBCQ Monticello ME	5110am	
2300 0000	USA, WBCQ Monticello ME	7415am 9330am	
2300 0000	USA, WEWN Vandiver AL	11520va	
2300 0000 smtwhf	USA, WHRI Cypress Creek SC	5920ca	

2300 0000 Sat	USA, WHRI Cypress Creek SC	9690na	
2300 0000	USA, WINB Red Lion PA	9265ca	
2300 0000	USA, WRMI Miami FL	9955ca	
2300 0000	USA, WTJC Newport NC	9370na	
2300 0000	USA, WTWW Lebanon TN	9479na	
2300 0000	USA, WWCR Nashville TN	7465na 9350na	
	9980na 13845na		
2300 0000	USA, WWRB Manchester TN	3215na 6890va	
2300 0000	USA, WYFR/Family Radio Worldwide	5950na	
	11580sa 15655sa	15440na	
2300 2330	Australia, Radio Australia	11695as 15240as	
	17795pa		
2300 2330	USA, Voice of America/Special English	9570as	
	13805va 15145va		
2300 2330 DRM	Vatican City State, Vatican Radio	9755am	
2300 2345	USA, WYFR/Family Radio Worldwide	11740na	
2305 0000	Canada, Radio Canada International	6100na	
2330 0000	UK, BBC World Service	9580as	
2330 0000	USA, Voice of America/Special English	7460as	
	9570va 13805va	15145va 15340va	
2330 0000	Vietnam, Voice of Vietnam	9840as 12020as	

MT SHORTWAVE STATION RESOURCE GUIDE

Albania, Radio Tirana	http://rtsh.sil.at/
Anguilla, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Argentina, Radio Nacional RAE	www.radionacional.com.ar/
Australia, ABC NT Alice Springs	www.abc.net.au/radio/
Australia, ABC NT Katherine	www.abc.net.au/radio/
Australia, ABC NT Tennant Creek	www.abc.net.au/radio/
Australia, HCJB Global Voice Australia	www.hcjb.org/
Australia, Radio Australia	www.abc.net.au/ra/
Austria, AWR Europe	www.awr2.org/
Bahrain, Radio Bahrain	www.radiobahrain.fm/
Bangladesh, Bangladesh Betar	www.betar.org.bd/
Belarus, Radio Belarus	www.radiobelarus.tvr.by/eng/
Belgium, TDP Radio	www.airtime.be/schedule.html
Belgium, TDP Radio/Disco Palace	www.airtime.be/schedule.html
Bhutan, Bhutan Broadcasting Service	www.bbs.com.bt/
Bulgaria, Radio Bulgaria	www.bnr.bg/
Canada, CBC NQ SW Service	www.cbc.ca/north/
Canada, CFRX Toronto ON	www.cfrb.com
Canada, CFVP Calgary AB	www.classiccountryam1060.com
Canada, CKZN St Johns NF	www.cbc.ca/listen/index.html
Canada, CKZU Vancouver BC	www.cbc.ca/bc
Canada, Radio Canada International	www.rcinet.ca/
China, China Radio International	www.cri.cn/
China, Voice of the Strait	www.vos.com.cn
Clandestine, Cotton Tree News	www.cottontreenews.org/
Clandestine, Sudan Radio Service/ SRS	www.sudanradio.org/
Croatia, Croatian Radio	www.hrt.hr/
Cuba, Radio Havana Cuba	www.radiohc.cu/
Czech Republic, Radio Prague	www.radio.cz/
Egypt, Radio Cairo	www.sis.gov.eg/
Ethiopia, Radio Ethiopia/External Service	www.erta.gov.et
France, Radio France Internationale	http://rfienglish.com
Germany, AWR Europe	www.awr2.org/
Germany, Blue Star Radio	www.mvbalticradio.de
Germany, Deutsche Welle	www.dw-world.de/
Germany, European Music Radio	www.emr.org.uk/
Germany, Pan American Broadcasting	www.radiopanam.com/
Germany, Radio Gloria International	www.radiopanam.com/
Germany, TWR Europe	www.twr.org
Greece, Voice of Greece	www.voiceofgreece.gr/
Greece, Voice of Greece/Radio Filia	www.voiceofgreece.gr/
Guam, KSDA/AWR	www.awr2.org/
Guam, KTWV/TWR	www.twr.org/
Guyana, Voice of Guyana	www.voiceofguyana.com/
India, All India Radio	www.allindiaradio.org/
Indonesia, Voice of Indonesia	www.voi.co.id
Iran, VOIRI/IRIB	www.irib.ir/English/
Japan, NHK World/ Radio Japan	www.nhk.or.jp/english/
Kuwait, Radio Kuwait	www.media.gov.kw/
Laos, Lao National Radio	www.lnr.org.la
Liberia, Star Radio	www.starradio.org.lr/
Libya, LJB/Voice of Africa	www.voiceofafrica.com.ly
Malaysia, RTM/Traxx FM	www.traxx.net/index.php
Malaysia, RTM/Voice of Malaysia	www.rtm.gov.my
Mali, ORTM Du Mali	www.ortm.ml
Monaco, TWR Europe	www.twr.org/
Mongolia, Voice of Mongolia	www.mnb.mn
Nepal, Radio Nepal	www.radionepal.org/
Netherlands, R Netherlands Worldwide	www.radionepal.org/
New Zealand, Radio NZ International	www.rnzi.com
Nigeria, Voice of Nigeria/External Service	www.voiceofnigeria.org

Oman, Radio Sultanate of Oman	www.oman-tv.gov.om
Pakistan, PBC/Radio Pakistan	www.radio.gov.pk
Palau, T8WH/WHRI/Sound of Hope Radio	www.whr.org/
Philippines, FEBC	www.febc.ph
Philippines, PBS/ Radyo Pilipinas	www.pbs.gov.ph/
Poland, Polskie Radio Warsaw	www.polskieradio.pl
Romania, Radio Romania International	www.rrr.ro/
Russia, Voice of Russia	www.ruvr.ru/
Rwanda, Radio Rwanda	www.orinfor.gov.rw/radiorwanda.eng.html
Saudi Arabia, BSKSA/Saudi Radio	www.saudiradio.net/
Serbia, International Radio of Serbia	www.glassrbije.org
Slovakia, IRRS/Euro Gospel Radio	www.nexus.org
Slovakia, IRRS/Radio City	www.nexus.org
Slovakia, IRRS/Radio Joystick	www.nexus.org
Slovakia, Radio Slovakia International	www.rsi.sk
South Africa, Amateur Radio Mirror Intl	www.sarl.org.za
South Africa, AWR	www.awr2.org/
South Africa, Channel Africa	www.channelafrica.org
South Africa, RTE Radio Worldwide	www.rte.ie/radio1/
South Africa, TWR Africa	www.twr.org/
South Korea, KBS World Radio	http://rki.kbs.co.kr/english/
Spain, Radio Exterior de Espana	www.ree.rne.es/
Sri Lanka, SLBC	www.slbc.lk
Swaziland, TWR Swaziland	www.twrafrica.org
Sweden, Radio Sweden	www.sr.se/rs/english/
Syria, Radio Damascus	www.rtv.gov.sy/
Taiwan, Radio Taiwan International	http://english.riti.org.tw/
Thailand, Radio Thailand World Service	www.hsk9.com/
Turkey, Voice of Turkey	www.trt.net.tr
Uganda, Dunamis Shortwave	www.biblevoice.org/stations/east-africa
Uganda, UBC Radio	www.ubconline.co.ug
UK, BBC World Service	www.bbc.co.uk/worldservice/
UK, Bible Voice Broadcasting	www.biblevoice.org/
Ukraine, Radio Ukraine International	www.nrcu.gov.ua/
United Arab Emirates, FEBA Radio	www.febairadio.info
United States, Overcomer Ministries	www.overcomerministries.org/
USA, American Forces Network	http://myafn.dodmedia.osd.mil/
USA, EWTN/WEWN Vandiver AL	www.ewtn.com
USA, KNLS Anchor Point AK	www.knls.org/
USA, Voice of America	www.voanews.com/
USA, Voice of America/Special English	www.voanews.com/
USA, Voice of America/Studio 7	www.voanews.com/
USA, WBCQ Monticello ME	www.wbcq.com/
USA, WHRI Cypress Creek SC	www.whr.org/
USA, WINB Red Lion PA	www.winb.com/
USA, WRMI Miami FL	www.wrmi.net/
USA, WRNO New Orleans LA	www.wrnoworldwide.org/
USA, WTJC Newport NC	www.fbnradio.com/
USA, WTWW Lebanon TN	www.wtww.us
USA, WWCR Nashville TN	www.wwcr.com
USA, WWRB Manchester TN	www.wwrb.org/
USA, WYFR/Family Radio Worldwide	www.familyradio.com/
Vatican City State, Vatican Radio	www.vaticanradio.org
Vatican City State, Vatican Radio/Mass	www.vaticanradio.org
Vietnam, Voice of Vietnam	www.vov.org.vn
Yemen, Republic of Yemen Radio/Radio Sana'a	www.yemenradio.net
Zambia, 1 Africa-CVC Africa	www.1africa.tv
Zambia, Radio Christian Voice/The Voice Africa	www.1africa.tv

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
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QSLing the Unpredictable and Unlicensed

Urban legends and things that go bump in the night: Even in shortwave radio, one night a year brings out the bizarre and unpredictable.

Radio Bob, one of my favorite former pirate broadcasters, once graced the airwaves on Halloween with an unforgettable radio voyage through the bizarre world of ghostly goings-on from Shake Rag, Georgia. What became of Bob is anyone's guess, but last year's Pumpkin Patch Radio reminded us that *The Devil Went Down to Georgia* – and perhaps you'd like to QSL "if you dare." Satan Radio made its appearance with a mixture of backwards talk and death metal music, followed by Rig-O-Mortis' multimedia special from the Voice of Doom.

Historically, Halloween produces more pirate radio broadcasts than any other holiday. This year's weekend holiday on Sunday, October 31, will likely find more pirates haunting the airwaves, so begin checking on October 29-30 around 6925 (AM or USB), plus or minus 30 to 40 kHz. The majority of U.S. pirates operate between 2000-0400 UTC; however, some may opt for an earlier broadcast.

If the station QSLs, most operators will announce their email address or postal mail-drop address during the broadcast. Others may announce "QSL via FRN," a reference to the logs posted at Free Radio Weekly website

at www.frn.net. Some operators prefer to verify by scanning those logs, so be sure to include "please QSL" in your FRN Grapevines post.

To find out more about Free Radio Weekly, or to contribute, send an email to freeradio@gmail.com.

Ragnar Daneskjold keeps the pirate community up to date on pirate news through his *Pirates Week Podcast* on the Shortwave Pirate Info website at www.piratesweek.info/

European pirate stations may offer a Halloween special, though most appear to be a scaled down version of North American stations. European activity is best heard in North America from 2100-0200, around 3900-4025 and 5800-7490 kHz upper or lower sideband. Check, too, between 1300-1900 UTC on 15055-15080 kHz.

If you hear Mystery Radio, you can use that station as a propagation indicator for other European pirate stations. Programming is modern dance music and they broadcast daily on 6220 kHz. The best time to log Dutch pirate, Cupid Radio, is during their frequent DX frequency test, usually on 15070 kHz anytime from 1200-1600 UTC. Send your details to cupidradio@hotmail.com or to the Oldebroek address below.

Does the bizarre appeal to you? Maybe you're just curious and that first pirate has eluded your log book so far. Don't be surprised if you hear the likes of *Ghostbusters* from Pumpkin Patch Radio gracing the airwaves for Halloween 2010.

US EMAIL CONTACT LIST

Though not a complete list of all U.S. pirates, the following stations have been monitored within the past year.

All Aboard - allaboardradio@gmail.com
Ann Hoffer (post on FRN)
Barnyard Radio - barnyardradio@gmail.com
Blue Rhino Radio - bluerhinoradio@gmail.com
Blue Ridge Radio - blueridgeradio@gmail.com
Brando Radio - MarlonBrandoRadio@gmail.com
Calling Marco Radio - callingmarcoradio@gmail.com
Captain Morgan - captainradioshortwave@gmail.com
CE3K - radioce3k@gmail.com
Channel Z (Blue Ridge) - channelzradio@gmail.com
Dead Cat Radio (post on FRN)
Derby Shortwave - derbyshortwave@yahoo.com
Eccentric Shortwave - eccentricsw@yahoo.com
Grasscutter Radio (Merlin)
Grey Rhino Radio - greyrhinoradio@gmail.com
Iron Man Radio (Belfast) - ironmanradio@hotmail.com
KBOX - kboxradio@gmail.com
KUSA North America - kusanorthamerica@gmail.com
Liquid Radio - wrwbfm@gmail.com
MAC Shortwave - macshortwave@yahoo.com
Mack Truck Radio - macktruckradio@gmail.com
Maple Leaf Radio (Belfast) - radio.mapleleaf@gmail.com
Northwoods Radio - northwoodsradio@gmail.com
OTH Radio (post on FRN)
Pirate Radio Boston - pirateradioboston@gmail.com
Polka Dot Rhino Radio - polkadotrhinoradio@gmail.com
Pumpkin Patch Radio - pumpkinpatchradio@gmail.com
Punxsutawney Pothead Radio (Belfast) - puxradio@gmail.com
Radio Bronco - radiobronco@gmail.com
Radio Casablanca - radiocasablanca1@gmail.com
Radio Cinco de Mayo - radiocincomademayo@gmail.com
Radio Free Speech (Belfast) - radiofreespeech@gmail.com
Radio Free Whatever - radiofreewhatever@yahoo.com
Radio Ga-Ga - radiogaga6925@gmail.com
Radio Is My Friend - cherokeemental@yahoo.com
Radio Jamba International - krackerradio@pnol.com
Radio Josephine - radiojosephine@gmail.com
Radio Lunchbox - piratelunchbox@gmail.com
Radio Marlene - radioarlene@gmail.com
Radio Paisano - radiopaisano@gmail.com
Radio Pigmeat International - pigmeat_voab@yahoo.com
Radio SRV - radiosrv@gmail.com
Radio XXP - radiostationxxp@gmail.com
Red Rhino Radio - redrhinoradio@gmail.com
Satan Radio - satanradio@gmail.com
Somebody's Gotta Say It Radio - somebodyradio@gmail.com
Sycko Radio - syckradio@gmail.com
The Crystal Ship - tcshortwave@gmail.com
Thinking Man Radio - thinkingmanradio@gmail.com
Undercover Radio (Merlin) - undercoverradio@gmail.com
VUDU - vudu11@hotmail.com
Voice of the Beast (post on FRN)
Voice of Doom (post on FRN)
Voice of Honor thevoiceofhonor@gmail.com
Voice of KAOS voiceofkaos@gmail.com
Voice of Next Thursday voiceofnextthursday@gmail.com
Voice of the Robots voiceoftherobots@gmail.com
Voice of Spike voiceofspike@gmail.com
WBNY (Belfast) wbnradiobunny@gmail.com
WDDR World Wide ericblair@wddr1027.com
WEAK Radio weakradio@gmail.com
WFUQ dj_jack_hammer@rocketmail.com
WHJR heyjoe6925@gmail.com
WHYP whypradio@gmail.com
WNKR relay wnkr@rock.com
WTCR 20th Century Radio (Belfast) morbius@nyms.net
Weather Radio (post on FRN)
Wind Up Radio (post on FRN)
X-Ray Radio broadcastreception@hotmail.com
Yellow Rhino Radio yellowrhinoradio@gmail.com

PIRATE STATIONS

EUROPE

Atlantic Radio, 3910 kHz. Full data personal letter and post card from Stephen Prendergast. Received in 31 days for a pirate report to: atlanticradio12152@gmail.com or postal: Ballyvary, Castlebar, Co. Mayo, Ireland. (Silveri Gomez, Italy/playdx2003)

Borderhunter Radio, 6205 kHz. Full data e-QSL showing Frans at the mic and mixing board. Received in one day for pirate report to: borderhunterradio@hotmail.com (Andrew Yoder, PA/Cumbre DX)

Radio East Coast Holland, 6220 kHz. Full data e-QSL from Ronald, received in four days for pirate report to: eastcoastholland@hotmail.com (Gomez).

Radio Playback International, 6870 kHz. E-QSL received in 90 days for pirate report to: playbackinternational@gmail.com (Norbert Reiner, Germany/playdx2003)

Radio Skyline, 3980 kHz. E-QSL received in 14 days for pirate report to: skyline-horizon@hotmail.com (Reiner).

Radio Spaceman, 3900 kHz. E-QSL received in two days for pirate report to: 3927am@rock.com (Reiner).

UNITED STATES

Outhouse Radio, 6925USB. Date/frequency with Radio Caroline logo e-QSL. Received in a few hours for pirate report to: outhouseradio@gmail.com (Yoder)

Radio Ronin SW, 6950 kHz. Large full data color samurai card. Received in two weeks for email report to: radironinshortwave@gmail.com (Yoder).

PIRATE MAIL DROPS

U.S. addresses require three mint stamps. European drops recommend at least two IRCs.

Basel Box 510 CH-4010 Basel Switzerland	Eisenach SRS Deutschland (station name) Postfach 10 11 45 DE-99801 Eisenach Germany	Oldebroek P.O. Box 9 8096 ZG Oldebroek Netherlands
Belfast P.O. Box 1 Belfast, NY 14711 USA	Merlin Box 293 Merlin, Ontario NOP 1W0 Canada	Santiago Casilla 159 Santiago 14 Chile
BRS/ Blue Ridge Summit P.O. Box 109 Blue Ridge Summit, PA 17214 USA	Neede P.O. Box 73 7160AB Neede Netherlands	Ytterby c/o SRS News Ostra Porten 29 S-442 54 Ytterby Sweden



MTXTRA

Shortwave Broadcast Guide



PORTUGUESE

The following language schedule is extracted from our new *MTXtra Shortwave Broadcast Guide* pdf which is a free download to all *MTXpress* subscribers. This new online *Shortwave Broadcast Guide* has more than 9,100 station entries that include all languages being broadcasts via shortwave radio worldwide, sorted by time and updated monthly.

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0045	Ecuador, HCJB Global	11920sa	
0000	0045	USA, WYFR/Family Radio Worldwide	15190sa	
0000	0100	Angola, Radio Nacional de Angola	4950do	
0000	0100	Angola, Radio N'gola Yetu	7217do	
0000	0100	Argentina, Radio Nacional RAE	11710am	
0000	0100	Brazil, Jornal A Critica	5055do	
0000	0100	Brazil, Novas de Paz	6080do	9515do
		11725do		
0000	0100	Brazil, Radio Alvorada/Londrina	4865do	
0000	0100	Brazil, Radio Alvorada/Parintins	4965do	
0000	0100	Brazil, Radio Aparecida	5035do	6135al
		9630al	11855al	
0000	0100	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0000	0100	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0000	0100	Brazil, Radio Brasil	4785do	
0000	0100	Brazil, Radio Brasil Central	4985do	11815do
0000	0100	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0000	0100	Brazil, Radio Capixaba	4935do	
0000	0100	Brazil, Radio Clube do Para	4885do	
0000	0100	Brazil, Radio Cultura do Para	5045do	
0000	0100	Brazil, Radio Cultura Ondas Tropicais	4845do	
0000	0100	Brazil, Radio Cultura Sao Paulo	9615do	
		17815do		
0000	0100	Brazil, Radio Cultura/Araraquara	3365do	
0000	0100	Brazil, Radio Daqui	4905do	
0000	0100	Brazil, Radio Difusora Acerana	4885do	
0000	0100	Brazil, Radio Difusora Caceres	5055do	
0000	0100	Brazil, Radio Difusora de Macapa	4915do	
0000	0100	Brazil, Radio Difusora do Amazonas	4805do	
0000	0100	Brazil, Radio Difusora Roraima	4875do	
0000	0100	Brazil, Radio Difusora/Londrina	4815do	
0000	0100	Brazil, Radio Educacao Rural de Tefe	4925do	
0000	0100	Brazil, Radio Educadora	2380do	
0000	0100	Brazil, Radio Educadora 6 de Agosto	3255do	
0000	0100	Brazil, Radio Gaucha	6020do	11915do
0000	0100	Brazil, Radio Gazeta Universitaria	5955do	
		9685do	15325al	
0000	0100	Brazil, Radio Globo	6120do	9585do
		11804do		
0000	0100	Brazil, Radio Guaiba	6000do	11785do
0000	0100	Brazil, Radio Imaculada Conceicao	4755do	
0000	0100	Brazil, Radio Inconfidencia	6010do	15190do
0000	0100	Brazil, Radio Itatiaia	5969do	
0000	0100	Brazil, Radio Marumby	9665do	11750do
0000	0100	Brazil, Radio Municipal	3375do	
0000	0100	Brazil, Radio Missoes da Amazonia	4865do	
0000	0100	Brazil, Radio Mundial	3325do	
0000	0100	Brazil, Radio Nacional da Amazonia	6185do	
		11780do		
0000	0100	Brazil, Radio Nossa Voz	4975do	
0000	0100	Brazil, Radio Nove de Julho	9820do	
0000	0100	Brazil, Radio Novo Tempo	4895do	
0000	0100	Brazil, Radio Record	6150do	9505do
0000	0100	Brazil, Radio Rural	4765do	
0000	0100	Brazil, Radio Verdas Florestas	4865do	
0000	0100	Brazil, Radio Voz Missionaria	5940do	
0000	0100	Brazil, Super Radio Deus e Amour	6060do	
		9565do	11765do	
0000	0100	Brazil, Super Rede Boa Vontade	4860do	
0000	0100	Brazil, Voz Missionaria	5940do	
0000	0100	China, China Radio International	9560eu	
		9710eu		
0000	0100	Portugal, RDP Internacional	9715am	11630sa
		11940sa		
0000	0100	USA, WYFR/Family Radio Worldwide	11580sa	
		17725sa		
0030	0100	Vatican City State, Vatican Radio	7305sa	
		9610sa		

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0145	USA, WYFR/Family Radio Worldwide	7520sa	
0100	0200	Angola, Radio Nacional de Angola	4950do	
0100	0200	Angola, Radio N'gola Yetu	7217do	
0100	0200	Brazil, Jornal A Critica	5055do	
0100	0200	Brazil, Novas de Paz	6080do	9515do
		11725do		
0100	0200	Brazil, Radio Alvorada/Londrina	4865do	
0100	0200	Brazil, Radio Alvorada/Parintins	4865do	
0100	0200	Brazil, Radio Aparecida	5035do	6135al
		9630al	11855al	
0100	0200	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0100	0200	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0100	0200	Brazil, Radio Brasil	4785do	
0100	0200	Brazil, Radio Brasil Central	4985do	11815do
0100	0200	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0100	0200	Brazil, Radio Capixaba	4935do	
0100	0200	Brazil, Radio Clube do Para	4885do	
0100	0200	Brazil, Radio Cultura do Para	5045do	
0100	0200	Brazil, Radio Cultura Ondas Tropicais	4845do	
0100	0200	Brazil, Radio Cultura Sao Paulo	9615do	
		17815do		
0100	0200	Brazil, Radio Cultura/Araraquara	3365do	
0100	0200	Brazil, Radio Daqui	4905do	
0100	0200	Brazil, Radio Difusora Acerana	4885do	
0100	0200	Brazil, Radio Difusora Caceres	5055do	
0100	0200	Brazil, Radio Difusora de Macapa	4915do	
0100	0200	Brazil, Radio Difusora Roraima	4875do	
0100	0200	Brazil, Radio Difusora/Londrina	4815do	
0100	0200	Brazil, Radio Educacao Rural de Tefe	4925do	
0100	0200	Brazil, Radio Educadora	2380do	
0100	0200	Brazil, Radio Gaucha	6020do	11915do
0100	0200	Brazil, Radio Gazeta Universitaria	5955do	
		9685do	15325al	
0100	0200	Brazil, Radio Globo	6120do	9585do
		11804do		
0100	0200	Brazil, Radio Guaiba	6000do	11785do
0100	0200	Brazil, Radio Imaculada Conceicao	4755do	
0100	0200	Brazil, Radio Inconfidencia	6010do	15190do
0100	0200	Brazil, Radio Missoes da Amazonia	4865do	
0100	0200	Brazil, Radio Mundial	3325do	
0100	0200	Brazil, Radio Nacional da Amazonia	6185do	
		11780do		
0100	0200	Brazil, Radio Nossa Voz	4975do	
0100	0200	Brazil, Radio Nove de Julho	9820do	
0100	0200	Brazil, Radio Novo Tempo	4895do	
0100	0200	Brazil, Radio Record	6150do	9505do
0100	0200	Brazil, Radio Rural	4765do	
0100	0200	Brazil, Radio Verdas Florestas	4865do	
0100	0200	Brazil, Radio Voz Missionaria	5940do	
0100	0200	Brazil, Super Radio Deus e Amour	6060do	
		9565do	11765do	
0100	0200	Brazil, Super Rede Boa Vontade	4860do	
0100	0200	Brazil, Voz Missionaria	5940do	
0100	0200	Portugal, RDP Internacional	9715am	11630sa
		11940sa		
0100	0200	USA, WYFR/Family Radio Worldwide	11530sa	
		11550sa		

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230	Brazil, Radio Educadora	2380do	
0200	0300	Angola, Radio Nacional de Angola	4950do	
0200	0300	Angola, Radio N'gola Yetu	7217do	
0200	0300	Brazil, Jornal A Critica	5055do	
0200	0300	Brazil, Novas de Paz	6080do	9515do

0200	0300	11725do	
0200	0300	Brazil, Radio Alvorada/Londrina	4865do
		Brazil, Radio Aparecida	5035do 6135al
		9630al 11855al	
0200	0300	Brazil, Radio Bandeirantes	6090do 9645do
		11925do	
0200	0300	Brazil, Radio Boa Vontade	6160do 9550do
		11895do	
0200	0300	Brazil, Radio Brasil	4785do
0200	0300	Brazil, Radio Brasil Central	4985do 11815do
0200	0300	Brazil, Radio Cancao Nova	4825do 6105do
		9675do	
0200	0300	Brazil, Radio Capixaba	4935do
0200	0300	Brazil, Radio Clube do Para	4885do
0200	0300	Brazil, Radio Cultura do Para	5045do
0200	0300	Brazil, Radio Cultura Ondas Tropicais	4845do
0200	0300	Brazil, Radio Cultura Sao Paulo	9615do
		17815do	
0200	0300	Brazil, Radio Cultura/Araraquara	3365do
0200	0300	Brazil, Radio Daqui	4905do
0200	0300	Brazil, Radio Difusora Acerana	4885do
0200	0300	Brazil, Radio Difusora Caceres	5055do
0200	0300	Brazil, Radio Difusora de Macapa	4915do
0200	0300	Brazil, Radio Difusora Roraima	4875do
0200	0300	Brazil, Radio Difusora/Londrina	4815do
0200	0300	Brazil, Radio Gaucha	6020do 11915do
0200	0300	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
0200	0300	Brazil, Radio Globo	6120do 9585do
		11804do	
0200	0300	Brazil, Radio Guaiba	6000do 11785do
0200	0300	Brazil, Radio Imaculada Conceicao	4755do
0200	0300	Brazil, Radio Inconfidencia	6010do 15190do
0200	0300	Brazil, Radio Mundial	3325do
0200	0300 Sun	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
0200	0300	Brazil, Radio Nossa Voz	4975do
0200	0300	Brazil, Radio Nove de Julho	9820do
0200	0300	Brazil, Radio Novo Tempo	4895do
0200	0300	Brazil, Radio Record	6150do 9505do
0200	0300	Brazil, Radio Rural	4765do
0200	0300	Brazil, Radio Voz Missionaria	5940do
0200	0300	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
0200	0300	Brazil, Super Rede Boa Vontade	4860do
0200	0300	Brazil, Voz Missionaria	5940do
0200	0300	USA, WYFR/Family Radio Worldwide	11550sa
0230	0300	Japan, NHK World/ Radio Japan	6195sa
		9485sa 9510sa	

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0345	USA, WYFR/Family Radio Worldwide	11550sa
0300	0400	Angola, Radio Nacional de Angola	4950do
0300	0400	Angola, Radio N'gola Yetu	7217do
0300	0400	Brazil, Jornal A Critica	5055do
0300	0400	Brazil, Radio Alvorada/Londrina	4865do
0300	0400	Brazil, Radio Bandeirantes	6090do 9645do
		11925do	
0300	0400	Brazil, Radio Boa Vontade	6160do 9550do
		11895do	
0300	0400	Brazil, Radio Brasil	4785do
0300	0400 Sat/Sun	Brazil, Radio Brasil Central	4985do 11815do
0300	0400	Brazil, Radio Cancao Nova	4825do 6105do
		9675do	
0300	0400	Brazil, Radio Capixaba	4935do
0300	0400	Brazil, Radio Clube do Para	4885do
0300	0400	Brazil, Radio Daqui	4905do
0300	0400	Brazil, Radio Difusora Acerana	4885do
0300	0400	Brazil, Radio Difusora Caceres	5055do
0300	0400	Brazil, Radio Difusora de Macapa	4915do
0300	0400	Brazil, Radio Difusora Roraima	4875do
0300	0400	Brazil, Radio Gaucha	6020do 11915do
0300	0400	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
0300	0400	Brazil, Radio Globo	6120do 9585do
		11804do	
0300	0400	Brazil, Radio Guaiba	6000do 11785do
0300	0400	Brazil, Radio Imaculada Conceicao	4755do
0300	0400	Brazil, Radio Inconfidencia	6010do 15190do
0300	0400	Brazil, Radio Mundial	3325do
0300	0400 Sun	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
0300	0400	Brazil, Radio Nossa Voz	4975do
0300	0400	Brazil, Radio Nove de Julho	9820do
0300	0400	Brazil, Radio Novo Tempo	4895do
0300	0400	Brazil, Radio Record	6150do 9505do

0300	0400	Brazil, Radio Rural	4765do
0300	0400	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
0300	0400	Brazil, Super Rede Boa Vontade	4860do
0300	0400	Brazil, Voz Missionaria	5940do
0300	0400	USA, WYFR/Family Radio Worldwide	7730sa

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0445	USA, WYFR/Family Radio Worldwide	11530af
0400	0500	Angola, Radio Nacional de Angola	4950do
0400	0500	Angola, Radio N'gola Yetu	7217do
0400	0500	Brazil, Jornal A Critica	5055do
0400	0500	Brazil, Radio Alvorada/Londrina	4865do
0400	0500	Brazil, Radio Bandeirantes	6090do 9645do
		11925do	
0400	0500	Brazil, Radio Boa Vontade	6160do 9550do
		11895do	
0400	0500	Brazil, Radio Brasil	4785do
0400	0500	Brazil, Radio Cancao Nova	4825do 6105do
		9675do	
0400	0500	Brazil, Radio Capixaba	4935do
0400	0500	Brazil, Radio Clube do Para	4885do
0400	0500	Brazil, Radio Cultura/Araraquara	3365do
0400	0500	Brazil, Radio Daqui	4905do
0400	0500	Brazil, Radio Difusora Caceres	5055do
0400	0500	Brazil, Radio Difusora de Macapa	4915do
0400	0500	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
0400	0500	Brazil, Radio Globo	6120do 9585do
		11804do	
0400	0500	Brazil, Radio Imaculada Conceicao	4755do
0400	0500	Brazil, Radio Inconfidencia	6010do 15190do
0400	0500	Brazil, Radio Maria	4885do
0400	0500	Brazil, Radio Mundial	3325do
0400	0500 Sun	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
0400	0500	Brazil, Radio Nossa Voz	4975do
0400	0500	Brazil, Radio Nove de Julho	9820do
0400	0500	Brazil, Radio Novo Tempo	4895do
0400	0500	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
0400	0500	Brazil, Super Rede Boa Vontade	4860do
0400	0500	Brazil, Voz Missionaria	5940do
0430	0500 mtwhf	UK, BBC World Service	3380af 6100af
		6145af	

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0530 mtwhf	UK, BBC World Service	3380af 6100af
		6145af	
0500	0600	Angola, Radio Nacional de Angola	4950do
0500	0600	Angola, Radio N'gola Yetu	7217do
0500	0600	Brazil, Jornal A Critica	5055do
0500	0600	Brazil, Radio Alvorada/Londrina	4865do
0500	0600	Brazil, Radio Bandeirantes	6090do 9645do
		11925do	
0500	0600	Brazil, Radio Boa Vontade	6160do 9550do
		11895do	
0500	0600	Brazil, Radio Brasil	4785do
0500	0600	Brazil, Radio Cancao Nova	4825do 6105do
		9675do	
0500	0600	Brazil, Radio Capixaba	4935do
0500	0600	Brazil, Radio Clube do Para	4885do
0500	0600	Brazil, Radio Cultura/Araraquara	3365do
0500	0600	Brazil, Radio Daqui	4905do
0500	0600	Brazil, Radio Difusora Caceres	5055do
0500	0600	Brazil, Radio Difusora de Macapa	4915do
0500	0600	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
0500	0600	Brazil, Radio Globo	6120do 9585do
		11804do	
0500	0600	Brazil, Radio Imaculada Conceicao	4755do
0500	0600	Brazil, Radio Inconfidencia	6010do 15190do
0500	0600	Brazil, Radio Maria	4885do
0500	0600	Brazil, Radio Mundial	3325do
0500	0600 Sun	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
0500	0600	Brazil, Radio Nossa Voz	4975do
0500	0600	Brazil, Radio Nove de Julho	9820do
0500	0600	Brazil, Radio Novo Tempo	4895do
0500	0600	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
0500	0600	Brazil, Super Rede Boa Vontade	4860do
0500	0600	Brazil, Voz Missionaria	5940do
0500	0600 mtwhf	Portugal, RDP Internacional	7240eu

0530	0559	Germany, Deutsche Welle	17800af	
0530	0600	Germany, Deutsche Welle	9700af	21780af
0530	0600	Vatican City State, Vatican Radio	13765af	11625af
			15570af	

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0700	Angola, Radio Nacional de Angola	4950do	
0600	0700	Angola, Radio N'gola Yetu	7217do	
0600	0700	Brazil, Jornal A Critica	5055do	
0600	0700	Brazil, Radio Alvorada/Londrina	4865do	
0600	0700	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0600	0700	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0600	0700	Brazil, Radio Brasil	4785do	
0600	0700	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0600	0700	Brazil, Radio Capixaba	4935do	
0600	0700	Brazil, Radio Clube do Para	4885do	
0600	0700	Brazil, Radio Cultura/Araraquara	3365do	
0600	0700	Brazil, Radio Daqui	4905do	
0600	0700	Brazil, Radio Difusora Caceres	5055do	
0600	0700	Brazil, Radio Difusora de Macapa	4915do	
0600	0700	Brazil, Radio Gazeta Universitaria	5955do	
		9685do	15325al	
0600	0700	Brazil, Radio Globo	6120do	9585do
		11804do		
0600	0700	Brazil, Radio Imaculada Conceicao	4755do	
0600	0700	Brazil, Radio Inconfidencia	6010do	15190do
0600	0700	Brazil, Radio Maria	4885do	
0600	0700	Brazil, Radio Mundial	3325do	
0600	0700	Brazil, Radio Nacional da Amazonia	6185do	
		11780do		
0600	0700	Brazil, Radio Nossa Voz	4975do	
0600	0700	Brazil, Radio Nove de Julho	9820do	
0600	0700	Brazil, Radio Novo Tempo	4895do	
0600	0700	Brazil, Super Radio Deus e Amour	6060do	
		9565do	11765do	
0600	0700	Brazil, Super Rede Boa Vontade	4860do	
0600	0700	Brazil, Voz Missionaria	5940do	
0600	0700	France, Radio France Internationale	11830af	
0600	0700	Portugal, RDP Internacional	7240eu	
0645	0700	Brazil, Radio Itatiaia	5969do	
0645	0700	Portugal, RDP Internacional	11850eu	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0745	USA, WYFR/Family Radio Worldwide	9985eu	
0700	0800	Angola, Radio Nacional de Angola	4950do	
0700	0800	Angola, Radio N'gola Yetu	7217do	
0700	0800	Brazil, Jornal A Critica	5055do	
0700	0800	Brazil, Radio Alvorada/Londrina	4865do	
0700	0800	Brazil, Radio Aparecida	5035do	6135al
		9630al	11855al	
0700	0800	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0700	0800	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0700	0800	Brazil, Radio Brasil	4785do	
0700	0800	Brazil, Radio Brasil Central	4985do	11815do
0700	0800	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0700	0800	Brazil, Radio Capixaba	4935do	
0700	0800	Brazil, Radio Clube do Para	4885do	
0700	0800	Brazil, Radio Congonhas	4775do	
0700	0800	Brazil, Radio Daqui	4905do	
0700	0800	Brazil, Radio Difusora Caceres	5055do	
0700	0800	Brazil, Radio Difusora de Macapa	4915do	
0700	0800	Brazil, Radio Gazeta Universitaria	5955do	
		9685do	15325al	
0700	0800	Brazil, Radio Globo	6120do	9585do
		11804do		
0700	0800	Brazil, Radio Guaiba	6000do	11785do
0700	0800	Brazil, Radio Imaculada Conceicao	4755do	
0700	0800	Brazil, Radio Inconfidencia	6010do	15190do
0700	0800	Brazil, Radio Itatiaia	5969do	
0700	0800	Brazil, Radio Maria	4885do	
0700	0800	Brazil, Radio Mundial	3325do	
0700	0800	Brazil, Radio Nacional da Amazonia	6185do	
		11780do		
0700	0800	Brazil, Radio Nossa Voz	4975do	
0700	0800	Brazil, Radio Nove de Julho	9820do	
0700	0800	Brazil, Super Radio Deus e Amour	6060do	
		9565do	11765do	
0700	0800	Brazil, Super Rede Boa Vontade	4860do	

0700	0800	Brazil, Voz Missionaria	5940do	
0700	0800	Portugal, RDP Internacional	7240eu	11850eu
0700	0800	Portugal, RDP Internacional	12020eu	15160af
		12000va		

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0900	Angola, Radio Nacional de Angola	4950do	
0800	0900	Angola, Radio N'gola Yetu	7217do	
0800	0900	Brazil, Jornal A Critica	5055do	
0800	0900	Brazil, Novas de Paz	6080do	9515do
		11725do		
0800	0900	Brazil, Radio Alvorada/Londrina	4865do	
0800	0900	Brazil, Radio Aparecida	5035do	6135al
		9630al	11855al	
0800	0900	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0800	0900	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0800	0900	Brazil, Radio Brasil	4785do	
0800	0900	Brazil, Radio Brasil Central	4985do	11815do
0800	0900	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0800	0900	Brazil, Radio Capixaba	4935do	
0800	0900	Brazil, Radio Congonhas	4775do	
0800	0900	Brazil, Radio Cultura do Para	5045do	
0800	0900	Brazil, Radio Cultura Ondas Tropicais	4845do	
0800	0900	Brazil, Radio Cultura Sao Paulo	9615do	
		17815do		
0800	0900	Brazil, Radio Cultura/Araraquara	3365do	
0800	0900	Brazil, Radio Daqui	4905do	
0800	0900	Brazil, Radio Difusora Caceres	5055do	
0800	0900	Brazil, Radio Difusora de Macapa	4915do	
0800	0900	Brazil, Radio Difusora Roraima	4875do	
0800	0900	Brazil, Radio Difusora/Londrina	4815do	
0800	0900	Brazil, Radio Educadora	2380do	
0800	0900	Brazil, Radio Gazeta Universitaria	5955do	
		9685do	15325al	
0800	0900	Brazil, Radio Globo	6120do	9585do
		11804do		
0800	0900	Brazil, Radio Guaiba	6000do	11785do
0800	0900	Brazil, Radio Imaculada Conceicao	4755do	
0800	0900	Brazil, Radio Inconfidencia	6010do	15190do
0800	0900	Brazil, Radio Itatiaia	5969do	
0800	0900	Brazil, Radio Maria	4885do	
0800	0900	Brazil, Radio Mundial	3325do	
0800	0900	Brazil, Radio Nacional da Amazonia	6185do	
		11780do		
0800	0900	Brazil, Radio Nossa Voz	4975do	
0800	0900	Brazil, Radio Nove de Julho	9820do	
0800	0900	Brazil, Radio Novo Tempo	4895do	
0800	0900	Brazil, Radio Record	6150do	9505do
0800	0900	Brazil, Radio Rural	4765do	
0800	0900	Brazil, Radio Voz Missionaria	5940do	
0800	0900	Brazil, Super Radio Deus e Amour	6060do	
		9565do	11765do	
0800	0900	Brazil, Super Rede Boa Vontade	4860do	
0800	0900	Brazil, Voz Missionaria	5940do	
0800	0900	Portugal, RDP Internacional	12020eu	
0800	0900	Portugal, RDP Internacional	12000va	15160af
0800	0900	USA, WYFR/Family Radio Worldwide	9605sa	
		9625sa	11770sa	
0830	0900	Portugal, RDP Internacional	11995eu	

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	1000	Angola, Radio Nacional de Angola	4950do	
0900	1000	Angola, Radio N'gola Yetu	7217do	
0900	1000	Brazil, Novas de Paz	6080do	9515do
		11725do		
0900	1000	Brazil, Radio Alvorada/Londrina	4865do	
0900	1000	Brazil, Radio Aparecida	5035do	6135al
		9630al	11855al	
0900	1000	Brazil, Radio Bandeirantes	6090do	9645do
		11925do		
0900	1000	Brazil, Radio Boa Vontade	6160do	9550do
		11895do		
0900	1000	Brazil, Radio Brasil	4785do	
0900	1000	Brazil, Radio Brasil Central	4985do	11815do
0900	1000	Brazil, Radio Cancao Nova	4825do	6105do
		9675do		
0900	1000	Brazil, Radio Capixaba	4935do	
0900	1000	Brazil, Radio Clube do Para	4885do	
0900	1000	Brazil, Radio Congonhas	4775do	
0900	1000	Brazil, Radio Cultura do Para	5045do	
0900	1000	Brazil, Radio Cultura Ondas Tropicais	4845do	

0900	1000	Brazil, Radio Cultura Sao Paulo	9615do
		17815do	
0900	1000	Brazil, Radio Cultura/Araraquara	3365do
0900	1000	Brazil, Radio Daqui	4905do
0900	1000	Brazil, Radio Difusora Acerana	4885do
0900	1000	Brazil, Radio Difusora Caceres	5055do
0900	1000	Brazil, Radio Difusora Caceres	5055do
0900	1000	Brazil, Radio Difusora de Macapa	4915do
0900	1000	Brazil, Radio Difusora Roraima	4875do
0900	1000	Brazil, Radio Difusora/Londrina	4815do
0900	1000	Brazil, Radio Educadora	2380do
0900	1000	Brazil, Radio Gaucha	6020do
0900	1000	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
0900	1000	Brazil, Radio Globo	6120do
		11804do	9585do
0900	1000	Brazil, Radio Guaiba	6000do
0900	1000	Brazil, Radio Imaculada Conceicao	4755do
0900	1000	Brazil, Radio Inconfidencia	6010do
0900	1000	Brazil, Radio Itatiaia	5969do
0900	1000	Brazil, Radio Maria	4885do
0900	1000	Brazil, Radio Marumby	9665do
0900	1000	Brazil, Radio Municipal	3375do
0900	1000	Brazil, Radio Missoes da Amazonia	4865do
0900	1000	Brazil, Radio Mundial	3325do
0900	1000	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
0900	1000	Brazil, Radio Nossa Voz	4975do
0900	1000	Brazil, Radio Nove de Julho	9820do
0900	1000	Brazil, Radio Novo Tempo	4895do
0900	1000	Brazil, Radio Record	6150do
0900	1000	Brazil, Radio Rural	4765do
0900	1000	Brazil, Radio Trans Mundial	5964do
		11735do	9530al
0900	1000	Brazil, Radio Voz Missionaria	5940do
0900	1000	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
0900	1000	Brazil, Super Rede Boa Vontade	4860do
0900	1000	Brazil, Voz Missionaria	5940do
0900	1000	Portugal, RDP Internacional	12020eu
0900	1000	Portugal, RDP Internacional	12000va
0900	1000	Sat/Sun Portugal, RDP Internacional	15160af
0900	1000	Sat/Sun/DRM USA, WYFR/Family Radio Worldwide	6175sa
		9605sa 9625sa 11770sa	
0927	1000	Brazil, Radio Alvorada/Parintins	4865do
0930	1000	Brazil, Radio Difusora do Amazonas	4805do
0930	1000	Japan, NHK World/ Radio Japan	6195sa
		9485sa 9510sa	

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030	USA, Voice of America	17740af
1000	1045	USA, WYFR/Family Radio Worldwide	6175sa
		9605sa 11770sa	
1000	1100	Angola, Radio Nacional de Angola	4950do
1000	1100	Angola, Radio N'gola Yetu	7217do
1000	1100	Brazil, Novas de Paz	6080do
		11725do	9515do
1000	1100	Brazil, Radio Alvorada/Londrina	4865do
1000	1100	Brazil, Radio Aparecida	5035do
		9630al 11855al	6135al
1000	1100	Brazil, Radio Bandeirantes	6090do
		11925do	9645do
1000	1100	Brazil, Radio Boa Vontade	6160do
		11895do	9550do
1000	1100	Brazil, Radio Brasil	4785do
1000	1100	Brazil, Radio Brasil Central	4985do
1000	1100	Brazil, Radio Cancao Nova	4825do
		9675do	6105do
1000	1100	Brazil, Radio Capixaba	4935do
1000	1100	Brazil, Radio Clube do Para	4885do
1000	1100	Brazil, Radio Congonhas	4775do
1000	1100	Brazil, Radio Cultura do Para	5045do
1000	1100	Brazil, Radio Cultura Ondas Tropicais	4845do
1000	1100	Brazil, Radio Cultura Sao Paulo	9615do
		17815do	
1000	1100	Brazil, Radio Cultura/Araraquara	3365do
1000	1100	Brazil, Radio Daqui	4905do
1000	1100	Brazil, Radio Difusora Acerana	4885do
1000	1100	Brazil, Radio Difusora Caceres	5055do
1000	1100	Brazil, Radio Difusora de Macapa	4915do
1000	1100	Brazil, Radio Difusora do Amazonas	4805do

1000	1100	Brazil, Radio Difusora Roraima	4875do
1000	1100	Brazil, Radio Difusora/Londrina	4815do
1000	1100	Brazil, Radio Educacao Rural de Tefe	4925do
1000	1100	Brazil, Radio Educadora	2380do
1000	1100	Brazil, Radio Educadora 6 de Agosto	3255do
1000	1100	Brazil, Radio Gaucha	6020do
1000	1100	Brazil, Radio Gazeta Universitaria	5955do
		9685do 15325al	
1000	1100	Brazil, Radio Globo	6120do
		11804do	9585do
1000	1100	Brazil, Radio Guaiba	6000do
1000	1100	Brazil, Radio Inconfidencia	6010do
1000	1100	Brazil, Radio Itatiaia	5969do
1000	1100	Brazil, Radio Maria	4885do
1000	1100	Brazil, Radio Marumby	9665do
1000	1100	Brazil, Radio Municipal	3375do
1000	1100	Brazil, Radio Missoes da Amazonia	4865do
1000	1100	Brazil, Radio Mundial	3325do
1000	1100	Brazil, Radio Nacional da Amazonia	6185do
		11780do	
1000	1100	Brazil, Radio Nossa Voz	4975do
1000	1100	Brazil, Radio Nove de Julho	9820do
1000	1100	Brazil, Radio Novo Tempo	4895do
1000	1100	Brazil, Radio Record	6150do
1000	1100	Brazil, Radio Rio Mar	6160do
1000	1100	Brazil, Radio Rural	4765do
1000	1100	Brazil, Radio Senado	5990do
1000	1100	Brazil, Radio Trans Mundial	5964do
		11735do	9530al
1000	1100	Brazil, Radio Voz Missionaria	5940do
1000	1100	Brazil, Super Radio Deus e Amour	6060do
		9565do 11765do	
1000	1100	Brazil, Super Rede Boa Vontade	4860do
1000	1100	Brazil, Voz Missionaria	5940do
1000	1100	Portugal, RDP Internacional	12020eu
1000	1100	Portugal, RDP Internacional	12000va
1030	1100	Brazil, Radio Verdas Florestas	4865do

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1130	mtwhfa	Vatican City State, Vatican Radio	21680sa
1100	1200		Angola, Radio Nacional de Angola	4950do
1100	1200		Angola, Radio N'gola Yetu	7217do
1100	1200	mtwhf	Argentina, Radio Nacional RAE	6060am
			11710am	
1100	1200		Brazil, Novas de Paz	6080do
			11725do	9515do
1100	1200		Brazil, Radio Alvorada/Londrina	4865do
1100	1200		Brazil, Radio Aparecida	5035do
			9630al 11855al	6135al
1100	1200		Brazil, Radio Bandeirantes	6090do
			11925do	9645do
1100	1200		Brazil, Radio Boa Vontade	6160do
			11895do	9550do
1100	1200		Brazil, Radio Brasil	4785do
1100	1200		Brazil, Radio Brasil Central	4985do
1100	1200		Brazil, Radio Cancao Nova	4825do
			9675do	6105do
1100	1200		Brazil, Radio Capixaba	4935do
1100	1200		Brazil, Radio Clube do Para	4885do
1100	1200		Brazil, Radio Congonhas	4775do
1100	1200		Brazil, Radio Cultura do Para	5045do
1100	1200		Brazil, Radio Cultura Ondas Tropicais	4845do
1100	1200		Brazil, Radio Cultura Sao Paulo	9615do
			17815do	
1100	1200		Brazil, Radio Cultura/Araraquara	3365do
1100	1200		Brazil, Radio Daqui	4905do
1100	1200		Brazil, Radio Difusora Acerana	4885do
1100	1200		Brazil, Radio Difusora Caceres	5055do
1100	1200		Brazil, Radio Difusora de Macapa	4915do
1100	1200		Brazil, Radio Difusora do Amazonas	4805do
1100	1200		Brazil, Radio Difusora Roraima	4875do
1100	1200		Brazil, Radio Difusora/Londrina	4815do
1100	1200		Brazil, Radio Educacao Rural de Tefe	4925do
1100	1200		Brazil, Radio Educadora	2380do
1100	1200		Brazil, Radio Educadora 6 de Agosto	3255do
1100	1200		Brazil, Radio Gaucha	6020do
1100	1200		Brazil, Radio Gazeta Universitaria	5955do
			9685do 15325al	
1100	1200		Brazil, Radio Globo	6120do
			11804do	9585do

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Monitoring the Chinese Navy

In recent weeks, tensions in the Far East have flared up and some monitors are turning their attention toward the region. Several incidents in and around the Korean Peninsula have added to tensions. Any time the region goes on high alert, most military monitors think about China, since they are one of the major military players in this portion of the world.

The People's Liberation Army Navy (PLAN or PLA Navy) is the naval branch of the People's Liberation Army (PLA), the military arm of the People's Republic of China. Until the early 1990s, the navy performed a subordinate role to the PLA Land Forces. Since the 1990s, it has undergone rapid modernization.

The PLA Navy is currently the second largest naval service in the world after the United States Navy. With personnel more than 250,000 strong, the PLAN also includes 35,000 coastal defense forces, 56,000 naval infantry/marines, in addition to a 56,000 PLAN naval air arm operating several hundred land-based aircraft and ship-based helicopters. As part of its overall program of naval modernization, the service also plans to develop a blue-water navy.

The People's Liberation Army Navy has become more prominent in recent years due to a change in Chinese strategic priorities. The new strategic threats include possible conflict with the United States and/or a resurgent Japan in areas such as the Taiwan Strait or the South China Sea. Robert D. Kaplan, an American journalist and military forces expert, has been quoted as saying that it was "the collapse of the Soviet Union that allowed China to transfer resources

from its army to its navy and other force projection assets."

The PLAN force consists of more than a hundred major combat vessels, organized into three fleets: the North Sea Fleet, the East Sea Fleet, and the South Sea Fleet.

- The North Sea Fleet, headquartered in Qingdao, Shandong Province, patrols the Bohai Bay and the Yellow Sea. Its flagship is DDG *Harbin*.
- The East Sea Fleet, headquartered in Ningbo, Zhejiang Province, patrols the East China Sea, which is called the Eastern Sea in Chinese. Its flagship is J302 *Chongmingdao*.
- The South Sea Fleet, headquartered in Zhanjiang, Guangdong Province, patrols the South China Sea, or the South Sea in Chinese. Its flagship is AOR/AK *Nanchang*.

❖ Bases

Military bases associated with the Chinese PLAN forces include the following:

North Sea Fleet

Major bases:

Qingdao (HQ), Huludao, Jianggezhuang, Guzhen Bay, Lushun, Xiaopingdao.

Minor bases:

Weihai Wei, Qingshan, Luda, Lianyungang, Ling Shan, Ta Ku Shan, Changshandao, Liuzhuang, Dayuanjiadun, Dalian

East Sea Fleet

Major bases:

Ningbo (HQ), Zhoushan, Shanghai, Daxie, Fujian.

Minor bases:

Zhenjianguan, Wusong, Xinxiang, Wenzhou, Sanduao, Xiamen, Xingxiang, Quandou, Wen Zhou SE, Wuhan, Dinghai, Jiaotou

South Sea Fleet

Major bases:

Zhanjiang (HQ), Yulin, Huangfu, Hong Kong, Guangzhou (Canton).

Minor bases:

Haikou, Shantou, Humen, Kuanchuang, Tsun, Kuan Chung, Mawai, Beihai, Ping Tan, San Chou Shih, Tang-Chiah Huan, Longmen, Bailong, Dongcun, Baimajing, Xiachuandao, Yuchi

PLANAF air bases include:

North Sea Fleet:

Dalian, Qingdao, Jinxi, Jiyuan, Laiyang, Jiaoxian, Xingtai, Laishan, Anyang, Changzhi, Liangxiang and Shan Hai Guan

East Sea Fleet:

Danyang, Daishan, Shanghai (Dachang), Ningbo, Lugiao, Feidong and Shitangqiao

South Sea Fleet:

Foluo, Haikou, Lingshui, Sanya, Guiping, Jialaishi and Lingling

❖ Chinese Military Comms – Enigma M89

Most military organizations such as the Chinese Navy rely heavily on HF radio communications, and we believe that the PLAN is no exception.

One of the major numbers station broadcasters in the HF spectrum – the Enigma M89 Morse code transmissions – have been attributed to the Chinese military. Extensive direction finding activities have pinpointed M89 transmitter sites near Guangzhou, Qingdao and the Dalian / Lushan areas. The network has various other locations throughout the country, such as Lanzhou and Xi'an.

Qingdao is the headquarters of China's North Sea Fleet, while Lushan is another major base of the North Sea Fleet and Dalian is one of the largest training facilities of the navy. Guangzhou is one of the largest bases associated with the South Sea Fleet.

L9CC and 2SLC seem to originate from the Dalian/Lushan area; 4XML from Qingdao; L4FC from Guangzhou; and NH8T from near Dandong (41.25° N, 124.27° E). Recently some new bearings were taken during a 4XML transmission on 10822.0 kHz. This transmission appeared to be coming from central China (38° 36' N, 107° 00' E), likely from either Lanzhou or Xi'an. That would place the 10 MHz transmission originating from a different location than the one used for the 8-MHz transmissions. It is, however, quite possible that all callsigns are being transmitted via all stations.

Long term monitoring of the M89 family of CW transmissions indicates that there are no fixed schedules or frequencies. Most of the M89 CW activity can be found in the 3- to 10-MHz portion of the HF spectrum and we have a complete list of recently reported M89 frequencies in Table 1.

For many years L9CC was the most widely heard callsign associated with the M89 transmissions, but it is now seldom copied. Station L9CC should be familiar to amateur radio operators who operate in the CW segment of the 40-meter amateur band. For years, L9CC had been a fixture in various IARU Intruder reports from all three ITU regions in the 7-7.1 MHz segment of the band.

The most common traffic that you will monitor is a continuous V marker tape. V CP17 CP17 CP17 de L9CC L9CC V MW3D MW3D MW3D de 2SLC 2SLC

Besides the channel markers that I have listed above, the network does transmit coded



The Royal Navy's Flag Ship HMS Ark Royal in the company of the Chinese Frigate Saigon, off the coast of the Isle of Wight. (Photo courtesy of the UK Royal Navy)

messages like the ones below (courtesy of the N&O bulletin published by Ary Boender).

v mw3d mw3d mw3d de 2slc 2slc (endless string)
v mw3d mw3d de 2slc 2slc hr cq msg nr
msg nr 226 ck 3t1 16 1t27 162t =
msg nr 226 ck 3t1 16 1t27 162t =
d3n5 tdn5 at64 43a6 7un3 a463 u57t 4t75 t55
ttaa 73ta 65ua un34 a46t 6dan dun3 ud5n
nad6 4a6u 6535 5u6t 76un u64d 5a3u u547
a6tn 5d3n d4a5 d53a dua3 a6n5 6and 3t3n
un67 4uad dtnt 4ndu u3da 4td3 5n7u 6437
5idu dau7 745a d6t5 576u dt45 7u6t 4n5d
un6t 37t4 a67t a6du nu6d u4an 47nu u4t5
dta3 3475 4t7n nadn 4na3 d74t d537 u36u
t75n 3a4d 7t65 3a7n 4au6 7u56 64da 435a
73t6 5da3 nunt 5dt4 53a7 6347 ud7u 63d3
74tn 35dt 543n 3675 a64n 7a5n at65 d4u7
467t 3nu4 7idu a6t6 3n34 d67t 6at7 nd7u
7u4t 57ta 73an
iii = n67n au3a 3t73 an4t 4na5 td65 6n7a 5tau
t55 ttau 7453 4a36 atdt a364 ada4 adat 53nt
n547 6dau 73du u634 ua37 n536 at~3 n7d4
tn66 dt76 u644 75u7 3ta4 uda5 ud53 ta5a
4d47 64a7 743t 6u37 733n 3aad n3at d463
ta34 t76t utu4 54t4 3t5t 67d7 au6u 5~u3
u365 u4nd a5u4 57d4 5n47 3a34 5t3n ud54
4ana 5u6d 5na3 6td6 3d65 n6an 5376 t373
tdt6 6d73 t46t a6u5 n~65 a763 7nun 76du
tn76 3t5a u7a4 6tn7 dund ud53 n7td nu74
7nu5 7467 n7nu t53n 5d57 6tda d456 7atu
5ua5 a3d7 d35u n6n5 n4d5 53d5 4tu6 nut3
5u74 64nn dduu
iii = 4tn3 tdaa t4u6 ut7u 53nt 6u35 u6d5 6dna
t55 tta3 dta7 3u63 67dt 3ud7 47t7 nan5
4u64 734t nt47 4dud 45d7 n3u3 t4u 7653
4n6u 4a56 a3tn an63 d73u 636u nat7 duat
tn73 43d7 5t3t 4563 5au6 74ua 6au6 634t
d55t nd56 6d57 td4u nuau 45a5 dna4 4ant
567u d4n4 7n7d 7367 43at 76du t5d5 tan6
73ad ntn6 uau5 7n74 d6n6 4n4t dad7 5n37
u5tu t75n tnt4 a7d4 a63a n474 7a45 udad
dt5n ataa 3d37 a4d5 u53t 5n64 53a3 3d5u
7a67 347t utd6 adn7 u5u3 nant 5a4a au4n
u7n4 3n56
6un5 73td n35d t356 56tn 744a 65t6 ud53
u57n u436
iii = 774a ar
msg nr 226 ck 3t1 16 1t27 162t =
v mw3d mw3d mw3d de 2slc 2slc (endless string)

Another traffic string variant:

v la5s la5s la5s de nh8t nh8t (endless string)
ugt comm = 361/5952/5885/58/53/8288/5/
558/a ar
ugt comm = 361/5952/5885/58/53/8288/5/
558/a ar
ugt comm = 361/5952/5885/58/53/8288/5/
558/a ar
v la5s la5s la5s de nh8t nh8t (continue)

Of course, no one outside the Chinese military knows what is contained within these messages, but regular monitors use the quantity of traffic being passed as an indicator of possible important events involving the stations being monitored.

These stations are also useful as propagation markers for possible radio paths into China and the Far East, since they transmit their channel markers almost continuously. As the Cycle 24 sunspot count continues to rise, we may catch more openings into China to monitor the Enigma M89 transmitters.

So, as things heat up in the Far East, keep our list of M89 frequencies handy and let us know what you are hearing. Until next month, 73 and good hunting.

CALL UP FREQUENCIES AND MARKERS

(Mode CW and frequencies kHz)

2DKI de 9CNV 3645.0
5J4I de YI4K 4770.0
7NPE de QV5B 4225.0 4227.0 5500.0
9UQW de 5ZBD 7414.0 7416.0
ABYZ de 6PJX 3340.0 3440.0 4567.0
4575.0 5600.0 6780.0 6785.0
AU34 de 567D 8120.0 8301.0
B7TZ de 8PNX 3846.0 4727.0 4927.0
4928.0 4929.0 4938.0 4988.0 7153.0
8038.0 8046.0
BFR7 de 4XML 3378.5 3380.0 5588.0
5645.0 5756.0 8189.5 8257.0 8303.0
8308.0 8455.0 8457.0 8457.1 10820.0
10822.0
CP17 de L9CC 3456.0 3507.0 3527.0
3529.0 3533.0 3536.1 3536.5 3540.0
3542.0 3542.2 3543.1 3543.5 3544.5
3545.0 3547.5 3549.0 3550.0 3551.7
3552.0 3553.0 3554.0 3555.0 3556.0
3556.4 3561.0 3564.0 3646.0 3673.5
5018.0 5032.0 5051.3 5402.0 5416.5
5418.0 5423.0 5428.0 5439.0 7000.0
7025.0 7026.0 7030.0 7031.2 7031.8
7034.0 7036.0 7036.3 7036.4 7038.8
7039.0 7041.0 7041.7 7043.7 7044.0
7045.5 7047.0 7047.9 7049.0 7049.9
7050.0 7050.5 7050.7 7050.8 7051.0
7052.0 7052.2 7052.4 7053.0 7053.2
7053.7 7054.0 7054.5 7054.9 7055.0
7055.4 7055.5 7056.0 7056.4 7056.7
7057.3 7057.6 7057.8 7058.0 7058.5
7058.6 7059.0 7059.1 7059.2 7059.5
7059.6 7059.7 7059.8 7060.0 7060.1
7060.2 7060.4 7060.5 7060.6 7060.7
7061.0 7061.1 7061.4 7061.5 7061.7
7061.8 7062.0 7062.1 7062.3 7062.4
7062.5 7062.7 7063.0 7063.3 7063.4
7063.7 7063.8 7063.9 7064.0 7064.5
7064.7 7065.0 7065.1 7065.2 7065.6
7065.8 7066.0 7066.5 7067.0 7067.3
7067.4 7067.7 7067.8 7068.0 7068.5
7068.9 7069.0 7069.1 7069.3 7069.9
7070.1 7071.5 7072.0 7072.8 7073.0
7074.0 7074.5 7074.7 7076.0 7079.0
7079.2 7079.4 7080.0 7080.7 7081.5
7082.0 7082.1 7083.2 7083.6 7084.2
7086.7 7087.7 7088.0 7088.4 7092.6
7100.0 7103.2 9266.5 9267.0 9422.0
9435.0 9436.9 9437.0
DKG6 de 3A7D 3641.5 5696.7 7596.6
7597.0 7598.5 7600.0 7601.4 7602.0
7602.9 7604.0
DKLO de SDKL 6458.0
FXP4 de YZL6 5795.0 9185.0 10566.0
10711.0
GKVZ de Q7NW 3297.0 3298.0 4670.0
4673.0 4982.0 5278.0 6667.0 6995.0
GM1W de B7UA 4415.0
GM2Z de PNW9 4824.0 4831.0 5628.0
5628.5 5629.3 5631.0 5633.5 6981.5
6992.0 7623.0
GM3Z de PNM9 4824.5 4825.6 4831.9
5625.0 5628.0 5636.0 5636.1 5636.5
6982.5 6992.0 12585.0 (PNW9 is probably
the correct callsign and the PNM9 callsign
could air due to a faulty tape)
GUGM de Z702 8808.0
HJ4I de YI4K 4770.0
HNR2 de CN9R 9071.0
HPBQ de V2KG 7718.0
IBEH de L4FC 4762.0 4769.0 4771.5
6501.0 6505.5 6508.2 7620.0 9343.5
9349.7
JAH3 de CI4W 5237.6 5240.0 5243.5
JS4X de 6DUO 5241.0 5520.0 6982.0
9071.5

KG? de F9SY 9220.0
KS8Q de 51JU 5875.0
LA5H de NH8T 4832.0 4874.0 5382.0
5386.0 5410.5 5412.0 5756.0 5874.0
6507.0 7300.0 7310.0 7313.0 8038.0
8042.0
LA5S de NH8T 4874.0 5381.9 5383.0
7300.0 7307.0 7310.0 8042.0 (LA5H is prob-
ably the correct callsign and the LA5S callsign
could air due to a faulty tape)
MB3B de YA6X 8378.0 8385.0
MW3D de 2SLC 3330.0/4440.0 4435.4
5580.0 5588.0/7074.0 7076.0
ONMT de B9VW 5719.0
QPZM de WOXN 3327.0 4523.0 7568.0
7570.0 7833.0 10643.0
RXP7 de CZT2 5086.0 7778.0 7779.0
7816.0 8050.0 8650.0 8727.0 8826.0
10475.0 10860.0 10864.0 11083.0 11084.0
20589.0
TA6EU de MB3R 4365.0
T3AP de QF3K 3397.0 3399.0 4727.0
5227.0 5643.0 5643.8 5644.0 5725.0
5727.0 8318.0 8321.0 8436.0 8437.0
8438.3 10830.0
TLU1 de SSC5 3562.0 5767.0 5770.0
TW9C de A2NK 5795.0
U8OV de 1RMK 3568.0 3570.0
XY5V de 4PPW 3846.0 4928.0 7145.0
8044.0
YAV8 de OTUV 5302.0 7737.0 8121.0
ZKT5 DE UWM2 8045.0

Other transmissions reported, but no current fre-
quencies available: 6DNG de 2NX2, HRT6 de
UANP, IQDW de IZJT, J9RZ de 8NMQ, NQ3J
de PLDR, and YELM de FC1T.

Variant transmissions:

BJCC de 3SA 16664.0
BJCQ de 3SW 10588.0
XSV86 de 3SY 8802.0
Q2M de NYZ 4860.0 6840.0 10640.0
(Note: The only variant with a different appear-
ance 3 x 3 callsign. The messages and traffic
behavior is similar to the other M89 stations.
NYZ always uses parallel frequencies 4860 and
6840 kHz.)
CQMSG DE CQMSG 3639.0 4146.0

Other reported M89 frequencies (kHz):

3197.0 3398.0 3546.4 3549.4 3551.0 3552.8
3553.2 3557.5 3558.4 3561.5 3565.6
3847.0 4224.0 4439.0 4602.0 4770.4
4778.0 4870.0 4873.0 5237.0 5304.0
5376.0 5384.0 5432.0 5436.5 5498.0
5634.0 5635.0 5636.6 5636.7 5728.0
5873.0 6066.5 6508.0 6509.0 6509.6
6510.0 6668.0 6788.0 6789.0 6925.5
6982.6 6985.0 7032.9 7039.8 7042.6
7042.7 7042.9 7045.0 7051.3 7051.5
7056.7 7056.8 7057.1 7057.5 7057.7
7057.9 7058.7 7059.3 7059.4 7061.6
7061.9 7062.2 7062.6 7062.9 7063.1
7063.4 7063.5 7064.1 7064.3 7064.8
7065.3 7065.4 7065.7 7066.1 7066.2
7066.3 7066.6 7066.7 7066.9 7067.2
7067.5 7067.6 7067.9 7068.0 7068.3
7068.6 7068.7 7068.8 7069.5 7069.6
7070.0 7070.5 7072.8 7072.9 7073.1
7073.3 7073.4 7073.7 7075.5 7076.6
7076.7 7077.0 7077.8 7078.0 7078.4
7081.7 7320.0 7568.1 7582.0 7597.8
7599.0 7600.8 7601.0 7601.5 7603.0
7741.0 8060.6 8437.8 8442.0 8727.9
8876.0 10831.0 16663.0



BROADCAST BANDSCAN

THE WORLD OF DOMESTIC BROADCASTING

Doug Smith, W9WI

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<http://americanbandscan.blogspot.com>

What is the Future for AM?

It seems that in every issue I'm writing about another AM station permanently gone. The total number of AM stations in the U.S. peaked in the 1990s at around 5,000 and it has been declining ever since. At the same time, there's been plenty of growth elsewhere in the broadcasting industry. But, even on the AM dial, we've got a long way to go before we run out of DX targets!

1970 found the United States with 6,751 radio stations, total. There were 691 commercial TV stations and 184 educational stations, for a total of 875. Forty years later, the total number of radio stations has more than doubled to 14,503. However, the number of AM stations has increased only 12%. The greatest growth has been in FM, where the number of commercial stations has tripled from just over 2,000 to about 6,500.

Growth among non-commercial FM stations has been even greater. There are *eight times* as many non-commercial FM stations today as there were forty years ago. Many of these are religious outlets. In 1970, most commercial stations carried some religious programming. Today, religious programming is rare on commercial radio.

Television has also grown since 1970. The number of TV stations has roughly doubled in the last forty years. (Of course, that only counts over-the-air stations. Channels delivered only by cable were rare in 1970, and almost nobody watched them. Satellite TV simply didn't exist.) Growth has been approximately equal among commercial and non-commercial stations. In the last six months, *after* the digital TV transition, two more commercial TV stations and one additional non-commercial station have hit the airwaves.

There are also the services that didn't exist at all in 1970. FM translators had first been authorized that year. By 1991, 1,875 of these low-powered relay stations made it on the air – and then there was the “Great Translator Invasion.” Changes in the rules – first, allowing translators hundreds if not thousands of miles from the station they relay, and then allowing FM translators to relay AM stations – resulted in the number of these stations tripling between 1991 and 2009.

Low-power TV and Class A TV didn't exist in 1970, either. The LPTV service has grown to 2,451 stations, and the Class A service to 523.

The broadcast service which has seen the greatest decline is *not* AM radio. TV translators were first authorized in 1956. By 1991, there were about 5,000 on the air; this number has declined by about 9%. On the other hand, there is

a recent upward trend; today there are about 5% *more* TV translators than there were in December 2009. Much of this recent increase is probably temporary, as separate licenses are taken out for digital translators serving the same areas as existing analog translators. Chances are, many of these will go away when the FCC requires the shutdown of analog TV translators.

Some of the “disappearing translators” haven't actually disappeared – they've converted to LPTV or Class A TV service.

❖ Disappearing Stations

Regarding AM stations going away for good, much of the bad news is from Canada this month. The big news is probably from Montreal. As you remember, the city's two biggest AM stations, CINW-690 and CINW-940, went off the air earlier this year. These stations have now surrendered their licences for cancellation.

There's been quite a bit of speculation among hobbyists that other Montreal stations will take over these prime frequencies. I haven't seen anything on this from the Canadian government, though.

In a second Canadian case, an AM station is going off the air involuntarily. Barring a successful appeal, CHSC-1220 will be disappearing. The station was licensed to broadcast in English, serving St. Catharines, Ontario, roughly 50km south of Toronto. The Canadian Radio-Television and Telecommunications Commission found that the station was actually broadcasting in Italian to an audience in Toronto. It also found that CHSC had no operational studio in St. Catharines. Lesser offenses included inadequate English-language news content and failure to file required paperwork. The CHSC license is scheduled to expire at the end of August. It will not be renewed.

In the U.S., such program-related com-

plaints – failure to carry adequate news content, failure to carry programming of interest to St. Catharines, broadcasting in the “wrong” language – would not be regulated. Content regulation in Canada is a lot looser than it used to be, but it's not completely deregulated. In the U.S. I would also expect the “non-renewal” of a station license would be fought in the courts. From what I'm hearing, the CHSC decision is likely final.

Recently, in a similar situation involving an FM station in Quebec City, a new owner took over the frequency and launched a new station with the same call letters and essentially the same programming. I suppose many listeners didn't even notice. However, a standalone AM station in St. Catharines is a lot less valuable than a Quebec City FM station, so I suspect you can count CHSC as dead.

A much less dramatic example of the vanishing AM band in Canada is the application by CFXG-1230 Grande Cache, Alberta, to move to 93.3 FM. Such applications are almost always granted. CFXG is a low-power relay of FM station CFXE-FM Edson (which in turn recently moved from 970 AM).

In the U.S., we have one AM station to report permanently gone, and one off briefly (and probably back by the time you read this).

KTON-940 was located in Belton, central Texas between Waco and Austin. The station had filed an application to move to Kaufman, near Dallas. This application also involved a frequency change to 950 kHz, made possible by the cancellation of a station on that frequency in nearby Denison. In early June, the KTON license was cancelled.

The station had been off the air since December 2008. The station's Wikipedia page says the towers were dismantled when the station failed to pay rent on the transmitter site. When the 940 Belton license was cancelled, there was no license to change to move to Kaufman – so that move is off as well.

A much larger station went dark on August 4th. Severe storms took down all three towers at WWVA-1170 Wheeling, West Virginia. The station has promised to rebuild; given the size of this operation, I think you can assume they will indeed do so. At this writing, WWVA programming has been moved to sister station WBBD-1400. I would expect temporary restoration of the WWVA signal in a week or so. It will probably take a few months to rebuild the original antenna system.

(Last-minute note: at deadline, WWVA is reported back on the air on a temporary antenna and at 5,000 watts, vs. their normal 50,000 watts of power.)



CHSC-1220 will be gone by the time you read this. (chsc.ca)

plaints – failure to carry adequate news content, failure to carry programming of interest to



AM radio towers are supposed to be vertical! WWVA-1170 was off briefly after storms collapsed their towers. (wwva.com)

Finally, a publication about radio is going dark. Since 1935, *Broadcasting Magazine* (later *Broadcasting and Cable*) has published an annual *Yearbook*. The *Yearbook* was a reference for advertisers, station executives, equipment suppliers, and other broadcasting professionals. It listed U.S., Canadian, and some foreign stations, providing technical details, lists of leading personnel, contact addresses and phone numbers, and station formats. Many a hobbyist has pursued a copy as well. (The price, on the order of \$400, tended to drive hobbyists away. However, quite a few of us have acquired used copies for much lower figures!)

I would imagine it comes as no surprise to most readers that the *Yearbook* was having a hard time competing with the Internet. Accurate technical data is available for free from the FCC. (The *Yearbook*, I'm afraid, had frequent inaccuracies.) Contact, personnel, and programming information is on Google, Wikipedia, and the stations' own websites. Internet information is continuously updated, whereas a print directory is obsolete almost instantly, especially given how often radio stations change programming format these days!

The 2010 edition of the *Broadcasting and Cable Yearbook* will be the last one published.

❖ The Good News

Most of this month's column seems to be bad news. The AM service is in decline; 50,000-watt stations are being deleted; 75-year-old publications are going by the wayside. The news isn't all bad, though.

Some years ago, the licensee of two Terre Haute, Indiana AM stations was convicted in state court of serious felonies. The FCC stripped him of his licenses, leaving Terre Haute with only one operating AM station. (A 50,000-watt FM station was also silenced!) In late July, the FCC held an auction of thirteen broadcast permits. One of them was the permit for AM 640 in Terre Haute. Birach Broadcasting Corp. bid \$53,000 for the permit. The auction of the other Terre Haute AM frequency, 1230, has not yet been settled.

(105.3 Durango, Colorado) and \$324,350 (98.9 Rosendale, New York). An FM permit in Shawsville, Virginia sold to a George S. Flinn Jr. of Memphis. Flinn is owner of a number of other broadcast stations (both radio and TV), mostly in the South. He's also a Republican candidate for the U.S. House of Representatives. One of his primary election opponents brought up the format of one of his West Tennessee stations as a campaign issue.

(Last-minute note: at deadline, Dr. Flinn came in third in the Republican primary. He'll have plenty of time to run his radio stations while the Congressional campaign continues without him.)

Permits have been granted for two new AM stations in central California. One station will broadcast from Bakersfield on the 1310 frequency abandoned by a Taft, California, station. The other will operate on 1330 from Porterville. Both stations will face an uphill battle, trying to make a profit on the AM dial.

❖ 'Til Next Month

How was your FM/TV DX season? I landed my second digital TV sporadic-E logging this summer: KOTA-TV channel 3 (RF channel 2) Rapid City, South Dakota. Have any of you experienced digital sporadic-E? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!

URLS IN THIS MONTH'S COLUMN

<http://americanbandscan.blogspot.com>

My DX blog

www.fcc.gov/mb/audio/totals/index.html

Broadcast Station Totals. (FCC)

www.wwva.com/cc-common/gallery/display.html?album_id=244870 Photo gallery of WWVA-1170 tower collapse

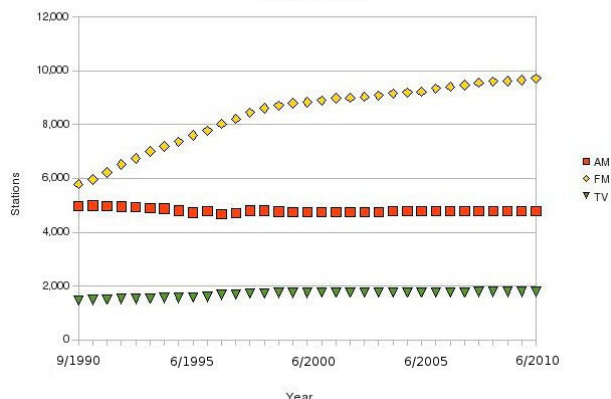
www.rbr.com/media-news/26083.html

Radio Business Report article on the end of the Broadcasting and Cable Yearbook

www.crtc.gc.ca/eng/archive/2010/2010-533.htm CHSC-1220 licence "unrenewed"

Broadcast Station Totals

USA, 1990-2010



The growth (or decline, in the case of AM...) of broadcasting in the U.S. since 1990.

FM permits sold for figures between \$15,000

OCTOBER BANDSCAN STATION REPORT

NEW:

Permits granted for new stations:

Bakersfield, California	1310
1,400/2,500 DA-2	
Porterville, California	1330
1,500/500 DA-2	
Terre Haute, Indiana	640
250/250 DA-2 (auction winner, permit not issued yet)	

Stations deleted:

St. Catharines, Ontario	1220	CHSC
Montreal, Quebec	690	CINF
Montreal, Quebec	940	CINW
Belton, Texas	940	KTON

CHANGES:

Frequency & location changes on the air:

Lumberton, Texas	1300	KSET
from Silsbee; power to 2,000/270 DA-2.		

Frequency & location changes denied:

Arden-Arcade, California	1210	KEBR
from Rocklin, California.		
Kaufman, Texas	950	KTON
from 940 at Belton, Texas. The KTON licence has been cancelled for remaining off the air for over a year.		

Frequency & location changes requested:

Grande Cache, Alberta	93.3	CFXG
from AM 1230		

Callsign changes:

Black Canyon City, Ariz.	710	KBMB
from KMIA		
Santa Barbara, California	1490	KSPE
from KIST		
Colorado Springs, Colo.	1580	KREL
from KKKK		
Augusta, Georgia	1340	WYNF
from WSGF		
Silver Spring, Maryland	1050	WBQH
from WTOP		
Natick, Massachusetts	1060	WQOM
from WBIX		
Burns, Oregon	1230	KBNH
from KZZR		
Mexia, Texas	1590	KLRK
from KRQX		
Claremont, Virginia	670	WRJR
(back) from WPMH		
Portsmouth, Virginia	1010	WPMH
(back) from WRJR		

ND: non-directional

DA-N: directional at night only

DA-D: directional during daytime only

DA-2: directional all hours, two different patterns

DA-3: directional day, night and critical hours, three different patterns



Southern Cross DX

On a recent visit to a local marine store, I noticed that their radio catalog contained some interesting new radios. The Standard Horizon GX2100 VHF radio had a built-in Automatic Identification System (AIS) unit. Their HX851 handheld had a built-in GPS. I guess we are heading for the VHF Digital Selective Calling (DSC) era quite quickly. I have not heard a date for mandatory operation in the Canadian Great Lakes, but rumors say it is not too far in the future. Many people have asked me for DSC upgrades to their VHF marine radio license.

I rarely watch the new reality television shows, but I have caught some episodes of *The Deadliest Catch*. These Bering Sea crab fishermen sure battle the wind and waves. I felt a true loss when Captain Phil Harris of the *Cornelia Marie* died. That show lost a genuine character.

I also watch for what radio information I can capture from the program. I noticed VHF channels 16, 14 and, of course, the US Coast Guard's 22A showing on their radios. HF radios showed the 4125 kHz emergency frequency, along with 4417 and 2088.4 kHz USB. I guess radio enthusiasts are always on the lookout for frequency data.

Kodiak Alaska's weather broadcasts on 6501 kHz USB have been heard here at times. I have also seen 7527 kHz listed as a US Coast Guard frequency.

Although it is October, the Atlantic hurricane season is not over. Be sure to monitor 14,325 kHz USB for storm information. The amateur radio hurricane net meets there whenever there is a tropical storm. They give the latest hurricane bulletins soon after they are issued. The reports they collect from affected areas are valuable to the National Hurricane Center in Miami, which is also often heard on the net. The center's amateur radio station, WX4NHC, is often on frequency as well.

On a local basis, be sure to monitor the local amateur 2 meter VHF repeaters during a storm or weather alert. Many amateurs collect weather observations and give out valuable information about power outages, etc. We have had several severe storm warnings this past summer and one tornado warning for our area. A weather radio with the weather alert code feature is a good item to have: My weather radio alarm has sounded many times this past summer.

❖ What You May be Hearing

I often look at other publications, columns and internet sites to see what frequencies I have researched are actually heard in North America. 12365 kHz from VMC in Australia, 12362 from VMW in Australia, and 5680 for Kinloss Rescue in the UK have been mentioned a few times. The US Coast Guard has been noted with ALE and voice on 5250, 5320, 7527, 15287 and 25350 kHz. 11494 kHz for US Coast Guard air from Point Reyes, California has also been heard. Coast Guard cutters have been heard on 6215 and 8337.6 kHz. (A real catch would be the maritime broadcast from the Netherlands on 18890 kHz at 2150 Z.) 5717 kHz for rescue traffic from Halifax has been noted. The Russian Navy has had CW on 8330 and 9075 kHz.

I also saw a listing for 8297 kHz for ZLM Taupo, New Zealand. That led me to research this station further.

❖ Under the Southern Cross

One of the astronomical formations visible only in the South Pacific is the Southern Cross. In hopes of some winter season DX, I began to research some of the radio frequencies used there.

ZLM Taupo Radio is the main marine radio center for New Zealand. They also issue Coastal Navigation warnings, Radio Navigational Warnings for Navarea XIV and Meteorological warnings. They work on the HF frequencies as well as having a system of 30 remote VHF marine stations all around the main islands of New Zealand. Besides 2182 kHz USB, they have supplemental calling on 2045 and 2068 kHz. They have inter-ship frequencies at 2456, 2638 and 2012 kHz. Private coastal stations use 2480 and 2444 kHz.

If you call on 4125 kHz, use 4146 or 4417 kHz for traffic. If you call on 6215 kHz, use 6224 or 6227 for traffic. ZLM also handles DSC and SITOR traffic.

ZLM's broadcast schedule is as follows: **Coastal Navigation** warnings, synopsis and forecasts are given at 0133, 0533, 1333, and 1733 on 2207, 4146 and 6224 kHz. **Coastal reports for shipping** are given at 0803, 1203 and 2003 on the same frequencies. **Warnings for Navarea XIV** and high seas forecasts with synopsis are given at 0303, 0903, 1503 and 2103 local time on 6224 and 12356 kHz. The broadcast is repeated at 0333, 0933, 1533 and 2133 local time on 8297 and 16531 kHz.

Another listing gave the frequency assignment for ZLM Taupo Radio as:

2183.4, 2208.4
4126.4, 4147.4, 4150.4
6216.4, 6225.4, 6228.4, 6231.4
8292.4, 8295.4, 8298.4
12291.4, 12354.4, 12357.4, 12360.4, 12363.4, 12366.4
16421.4, 16529.4, 16532.4, 16535.4, 16538.4, 16541.4, 16544.4, 16547.4
22160.4, 22166.4, 22172.4, 22178.4

All are in kHz and are USB. The frequency is 1.4 kHz above the carrier because of the use of sideband. This will be a great catch here in North America. I now have a winter target for monitoring. I would surely love to visit this station. A Google search for ZLM gives great results.

❖ South Pacific Dreaming

A very good list of South Pacific frequencies is available at www.islandcruising.co.nz.

I came across a listing for V8V222 Brunei Bay Radio in NW Borneo. Their main simplex channels are 4042 and 8170 kHz. They have supplementary simplex frequencies at: 6227, 8294, 12359, 18840, and 22168 kHz. 4483 and 6516 kHz can be used for yachting events. They



MV Birchglen, downbound with a cargo of grain, entering and actually lowering in Lock 7 of the Welland Canal.



The Pinta, a replica of Columbus's ship, upbound in the Welland Canal. This picture was possible because I listened to radio traffic and got to the canal before dark.

are assigned the following ITU channels:

Channel	Shore Transmit	Ship transmit (kHz)
428	4351	4351
608	6522	6221
835	8710	8710
1239	13191	12344
1804	19764	18789
2229	22780 2	2084

Broadcasts of various weather forecasts and marine information are made at the following times: Channels 428 and 608 are used at 2335 and 2345 UTC. Channels 835 and 1239 are used at 0035, 0045, 0055, 0135, 0145, 0155, 0205 and 0215 UTC. Channels 608 and 1239 are used at 0735 and 0745 UTC. Channel 1239 and simplex 16354 kHz are used at 0835, 0845, 0935 and 0945 UTC. Let me know if you hear this station – I hope I can!

Radio "Peri-Peri" broadcasts from East Africa. They give information for the Indian Ocean and South Atlantic as 8101 kHz at 0500 UTC and after the net they go to 12353 kHz. This is repeated at 1500 UTC.

ZSC Capetown South Africa monitors channel 16 VHF at their station and 12 remote stations which feed ZSC. They use 4417, 8779, 13137 and 17302 kHz to contact vessels. Weather forecasts are broadcast in FEC, SITOR mode at 0930 and 1730 on 4214, 6322, 8428.5, 12698 and 17164 kHz. Voice broadcasts follow at 0918 and 1718 on 4435 and 8719 kHz as well as VHF. ZSC monitors all international distress frequencies, both voice and DSC channels.

Last but not least, Russell Radio at the Bay of Islands is a private station in New Zealand. This is a voluntary radio system with the call ZMH310. They monitor VHF channels 16, 63 for working vessels and 03 for commercial traffic. Weather broadcasts are given at 0800, 09030, 1330 and 1730 on channel 63. They also monitor 2182 kHz emergency frequency.

Their HF schedule is to monitor 4417 kHz from 1900 to 1930, 4445 kHz from 1830 to 1900, 6516 kHz from 1800 to 1830 and 13101 kHz from 1630 to 1730 UTC. I consider this as a superb DX catch.

❖ Loran-C

I have now heard the Notice to Mariners on VBR Prescott radio's continuous broadcast, advising that the Canadian chain of Loran-C stations

has been decommissioned. The USCG terminated their stations for domestic areas including the Great Lakes on Feb. 8, 2010. As of August 3, 2010 the Canadian and US Coast Guards have terminated the Loran-C service for the east and west coasts. The system can no longer be used for navigation. Time does march on and 100 kHz should be very quiet indeed. This will be welcome news to amateurs who wish to experiment with their VLF allocations.

Another notice to mariners asked ships to keep their radar sets at a range of three miles or less while transiting the Welland Canal. It seems that stronger signals have been causing problems with the remote controls to raise and lower several bridges. Just another example of the RF environment we live in now.

Look around your home and see how many items you have that emit RF signals. Cell phones, cordless phones, remote weather stations and baby room monitors are just a few. Don't forget the accidental radio emitters like computers, monitors and flat screen television sets. There is a plasma TV near my home that emits broad band interference three houses away and much further if you have an antenna connected to your receiver. I am working to have this cleared up before the winter DX season. Hopefully, RF chokes on the power line may eliminate the problem.

❖ Fall/Winter VHF Listening

If you live in an area where there is winter freeze-up on the waterways, the traffic in November and December can be very interesting. Along the Seaway, ocean ships are beating a hasty retreat before the December closure of the system due to ice. The Seaway broadcasts bulletins through various coast stations as to the water temperature at Montreal, ice conditions in the canals, and the number of ocean vessels still in the system.

This is also the season of our famous November gales. Weather reports, broadcasts and warnings can all be heard. The Canadian Coast Guard Radio stations use channels 23B 161.65 MHz and 83B 161.775 MHz for their continuous marine broadcasts. The frequencies alternate between the remote towers connected to the main station to prevent overlap of signals.

Be sure to scan all the marine channels, as there may be some private use of the service in your area. For example, a local boat line uses channel 64A as they load passengers on and off the vessels.

I always scan the 450 to 470 MHz band when around any ships or harbors where you can hear a lot of internal communications and shore side chatter. The cruise ships use this band for communications between the various officers and departments. Also be sure to put the local fire department frequencies in your scanner if you have a fireboat or fire rescue marine unit in the area.

❖ Canadian Empress

Although I did not expect to be sailing on the *Canadian Empress* again, I got a call to help out when another mate got a chance to serve on HMS *Bounty*. The plan is for me to be on board for three trips: One trip from Kingston to Quebec City, one cruise around the Thousand Islands, and one trip from Kingston to Ottawa. I had to do a quick brush-up on the radio channels in use: The Seaway uses channels 11, 12, 13 and 14 for traffic control. Channels 17 and 13 are used to talk to each individual lock.

Channel 13 is maintained for bridge to bridge communications for commercial vessels. This is one frequency you should also monitor.

We carry a maximum of 64 passengers, and I enjoy meeting people from all over the world when aboard. Unfortunately, we do not carry marine HF radio equipment. Of course, I plan to get some photographs for my collection and the column.

❖ KSM in Danger

I received an email from Richard Dillman of the Marine radio Historical Society (MRHS) advising that historic radio stations like KSM are in danger of being forced off the air. He stated that the World Radio Conference 2012 proposals from the FCC would make digital communications so dominant that KSM and other historical radio stations would be forced off the air.

Although public comment was requested by Aug. 13, 2010, if you are interested in this service, go to the MRHS website, www.radiomarine.org, and get the full story.

I hope you all have the best of DX, no interference and great propagation. Perhaps at Christmas time, you might find some new gear as well.



The Canadian Provider approaching Iroquois Lock of the Seaway. This classic "laker" with its forward cabins is a dying breed. These vessels, built in the early 1960's, are reaching the end of their useful life. All new lakers have their cabins aft.



Connecting the World with EchoLink

As an amateur radio operator, I haven't had the best of luck with regard to my equipment. In the summer of 2005, my entire collection of HF equipment was taken out by a direct lightning strike to my house. The only thing I hadn't unplugged during the storm was the surge protector that all of the equipment was plugged into. With a brilliant flash of light, more than \$1,000 worth of equipment went up in smoke.

Last year, during a particularly nasty winter ice storm in the Carolinas, my mobile 2-meter rig's antenna suffered a fatal decapitation at the hands of about a half of inch of ice.

These two bouts with Mother Nature left me scrambling to get back on the air, but meanwhile I was down for the count for a brief time. Mother Nature 2, Loyd 0.

Ah, but technology is always evolving and creating new opportunities for amateurs to participate in their hobby, no matter the state of their equipment (or the size of their wallet). I touched briefly on EchoLink last month. This program has evolved into a bridge between computer and transmitter that has opened the doors for thousands of hams to get on the air, no matter the state of their equipment.

EchoLink is a Windows computer program that allows communication between hams from across the globe through Internet-streaming. Local hams set up a stream of their repeater through EchoLink, and with that simple interface, the entire world has access to talk through the repeater.

Recently, EchoLink even added an app to the Apple App Store so that users of iOS-based devices could access EchoLink-streamed repeaters.

The first part of the process is to download the software from the EchoLink Web site. The software is free and the latest version runs about 2.8MB. Once downloaded and installed on your machine, the next step to complete, before you can transmit to the world, is to verify your callsign.

For me, this was a hang up. I had moved to a new apartment in the last year, and hadn't yet updated my FCC license to reflect this change. So, after submitting the proper forms and receiving a new copy of my license, I proceeded with the callsign verification step.

There are several means at your disposal for verifying your callsign. Perhaps the easiest is to verify using your debit/credit card. This method matches the billing address on the card with the address on file with the FCC. To do this, you will be charged \$1 to your account. This step took me just a few minutes to complete and my callsign was verified.

Other options include sending a photocopy of your station license to EchoLink, or calling a phone number to verify, but in my experience the credit/debit card method was very quick and painless.

Once you have validated your callsign, you are free to begin exploring the world of Internet Amateur Radio!

Opening EchoLink for the first time, you will notice a long list of stations with location information, status, and the local time of the station. This is the index view. You can also operate in the Explorer view. This allows you to sort through stations that are organized by location, rather than an index of all stations. Most hams will probably operate with the Explorer view, just for ease in finding potential repeaters to work. If you are wondering where the local time went, just hover your mouse pointer over a repeater and you will see the local time and other station information.

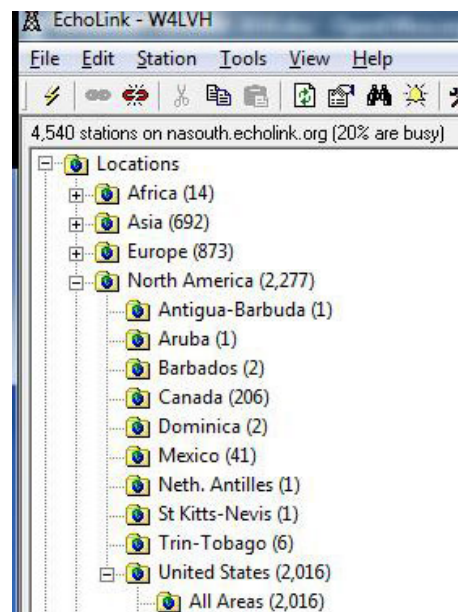
Once you find a repeater you want to talk on, simply double-click on the repeater name. Once connected, you will be receiving audio from the repeater!

Station	Stat	Time	Location
N7YO-L	On	18:10	Great Falls MT. 146.73R
DB0XG-R	On	02:13	Greding 145,775 MHz
EA1AAR-L	On	02:16	GredoSurMadrigalVeraCC
K9JQE-R	On	19:10	Green Bay, WI
W9OSL-R	On	19:14	Green Bay, WI
WE7GV-L	On	17:14	Green Valley, AZ
AL7RH-L	On	19:17	GreenBay WI 146.505 (1)
W2QW-R	On	20:14	Greenbrook, NJ
K4MFD-R	On	20:49	Greeneville, TN 37743
G3SNA-L	On	01:15	Greenfield, Saddleworth
W4DJW-R	On	20:15	Greenville SC 146.6 (1)
KC9HZT-L	On	20:14	Greenville, IN
KB8ZGL-R	On	20:14	Greenville, MI
WD4JPQ-R	On	20:11	Greenville, NC 145.35
W4ABEI-R	On	20:14	Greenville, SC
KSZZ	On	19:12	Greenville, TX

To transmit, your spacebar is the default hot-key to use. Simply tap the spacebar to begin transmitting, tap it again to end your transmission. That's it, really!

A tip for users: if you are connected to a repeater, you must first disconnect from that repeater before you connect to a new one.

If you can operate a traditional amateur radio transmitter, you can operate on EchoLink with ease! Of course, in order to operate and transmit

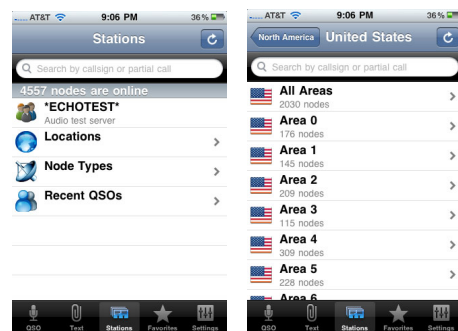


on EchoLink, your computer must have a sound card with either external speakers or headphones, and a microphone.

As mentioned earlier, there is also an app for iOS devices that allows you to operate EchoLink in a mobile environment. The EchoLink app has been an enjoyable way for me to show my friends the fun one can have through the magic of Amateur Radio!

The interface is very similar to the Explorer view of the EchoLink program. In my experience, if you are connected to a repeater through your computer, you cannot connect to that same repeater with your iOS device.

To test to make sure my EchoLink was working, I broke out my ICOM IC-T90A multiband transceiver and tuned in my local repeater that streams on EchoLink. I then transmitted through my computer, while listening to the audio on my ICOM. The audio quality was crisp and clear and very readable.



I then reversed my test and used the ICOM to transmit while receiving audio through EchoLink. Once again, the audio was crystal clear, no apparent buffering issues or net congestion problems. The EchoLink servers appear to be very capable of handling high-traffic; their Web site claims to often handle as many as 5,000 users at a time!

But who wants to stick with local repeaters, when the entire world is just a few mouse-clicks away? I first tuned in AL7YK-R repeater in Bethel, Alaska. It was really cool to hear the conversations about people going on camping trips to the Denali National Park, and then join in a chat with a few local people!

Deciding to take my exploration of the world even further, I was soon connected to repeaters in Australia, England, Bulgaria, Japan and India.

It was a thrill to have conversations with people in different countries again, something I had greatly missed since my HF rig took that nasty lightning strike more than five years ago. In my conversations, I learned that quite a few people even QSL their EchoLink conversations! It's a whole new frontier for amateur radio, and if the hobby is going to survive in the long-term, it is undoubtedly through technology like EchoLink that it will happen.

So, if you are a licensed amateur radio operator (and if you are not, it really has never been easier to do, so check into it!), I highly advise taking a look at EchoLink to expand your overall hobby experience. No matter how crummy the conditions might be, you can still communicate with the world any time you choose with EchoLink!

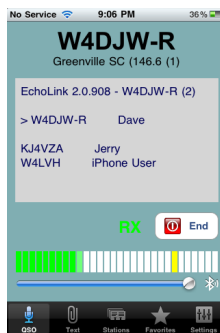
❖ A new ISP for me!

After months of research and twice as many months of hand-wringing over the quality of service from my previous Internet Service Provider (Charter Communications), I finally made the switch to AT&T's U-Verse service. All I can say is wow!

Now, I am not going to jump on my soapbox and turn this into an opportunity to bash Charter as a service provider (although the temptation is strong). What I will tell you is how wonderful an experience I have had thus far with U-Verse.

U-Verse is a fiber-optic-based service that combines not only telephone and broadband Internet, but also Internet Protocol Television (IPTV). Without getting too bogged down into the technical aspects of what U-Verse is, it basically is a two-wire service that provides online content directly to your home (no more sharing cable bandwidth with the neighbors) with at least a large portion of the connection coming through fiber-optic cable.

As an ISP, U-Verse has been flawless. The hub of all U-Verse service in the home is the Residential Gateway (RG). Essentially, this is a large router that sends signals to the proper devices (television, wireless Internet, Ethernet



connected devices, and telephones). This provides a very stable, encrypted Wireless-G network connection throughout your home.

As a comparison, my own personal Linksys Wireless-G router was constantly having issues with devices recognizing it or maintaining a connection, among others. The U-Verse RG has been stable with no issues at all since installation.

To test how reliable it was, I decided to push the RG a bit. I simultaneously tuned my television to an HD movie channel (with Dolby Digital 5.1 audio stream embedded), my bedroom television to an HD sports channel (also in 5.1), I downloaded music from iTunes on my PC, I turned all three of my WiFi radios on to different high-bit-rate streams, I played a game on my Xbox Live account, and I streamed a television station on my iPhone (using WiFi)! The RG didn't even blink, nor did I notice any significant decline in television picture quality, audio quality or Internet speed. I was blown away!

Not only are my Internet speeds faster due to not sharing bandwidth with my neighbors (I was paying for 25mbps download speed with Charter but averaging 12-14 mbps in actual speed tests), but the U-Verse servers themselves seem to be faster as well. This means there is less congestion at the ISP itself, which leads to a faster Internet connection.

If you are looking for a new alternative to your current ISP, at least check into U-Verse. It isn't available in all areas, so you will need to see if your address is covered by U-Verse service. If it is, I can highly recommend giving it a shot; packages are actually very cost-effective for what you get, and the customer service I have received thus far is head and shoulders above what I was getting with cable.

❖ Royalty Compromise on the Horizon?

Long-time readers of this column have probably been following, as I have, the spirited debate between musicians and radio stations over performance royalties. Radio stations have long paid royalties to song publishing companies such as BMI and ASCAP, but not to the artists themselves. So, if U2 decides to cover a Beatles song and it gets significant airplay, U2 doesn't see a dime but the Beatles make a healthy amount of cash.

In the last year or so, the music industry decided the solution to their recent financial woes was to ask Congress to force radio stations to pay performance royalties to the artists. If passed, the Congressional legislation would allow the Copyright Royalty Board (CRB) to dictate to radio stations what the royalties they would pay would be.

The broadcast industry has been screaming from the rooftops that such a move would be financially crippling to an industry already bleeding from the economic downturn. But now, it appears the broadcasters have decided that a compromise might be more cost-effective than fighting the extra royalties.

The National Association of Broadcasters has made moves to come to an agreement that would kill the Congressional bill and settle the royalty debate directly, through talks between

broadcasters and the music industry. The thinking is that any deal made between the two parties would likely save broadcasters money in the long run.

Though no deal has been agreed to yet, this situation bears watching. Whatever performance royalties are set for broadcasters will likely have a large impact on online streaming as well – not just the terrestrial broadcasters that also stream online, but also the royalties that Internet-only streaming stations pay.

Should broadcasters get stuck with a hefty bill to the artists, broadcasters would likely lean more heavily on their streaming content to save costs from traditional broadcasting. In addition, Internet-only stations that just recently came to an agreement with the music industry over royalties they pay, would likely be taking a hard look at the numbers to see if they can re-negotiate their rates, too.

Either way, online streaming products are likely to be directly impacted by the results of a pre-emptive agreement from both sides, or by Congressional legislation.

Until next month!

GLOBALNET LINKS

EchoLink - <http://echolink.org/>
 EchoLink iOS app - <http://itunes.apple.com/us/app/echolink/id350688562?mt=8>
 AT&T U-Verse - www.att.com/u-verse/#fbid=Hmlf1mQFCj6
 Radio Royalties Compromise Coming? - www.nydailynews.com/entertainment/music/2010/08/11/2010-08-11-artists_near_deal_on_paytoplay.html

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Longwave Timeline

For those of you following our broadband loop project (<http://tinyurl.com/ygt39z7>), a quick update is in order regarding my efforts to get the preamp board working. I should say "working properly," because I believe the basic amplifying circuitry is functioning just fine. I know this because when I touch certain areas of the board, signals come booming in, yet I am not getting strong pickup from the loop itself, and there is little or no directivity on the few signals I do receive.

To resolve the problem, I've been in discussion with the loop designer, Steve McDonald, VE7SL. Steve kindly gave me several things to check, but I did not have the time to investigate them prior to the column deadline, so the project remains on my bench, awaiting further attention. Steve's ideas include the following checks that I will be making:

- Proper transformer connections to the loop and preamp circuit
- Gap at the top of the loop free of metallic debris (which would short out the loop)
- Proper connection between coaxial shield and the circuit board's ground bus
- Proper component values and polarity/pin orientation
- Proper voltage at the transistors – specifically the Drain of the J310 FET, and the Base of the 2N3904

Stay tuned, and I'll have an update next month (and hopefully a conclusion) to my circuit board saga.

❖ LW Timeline

Now, on to this month's main topic. I've been writing this column since July of 1991, and it has been a very rewarding experience. Right from the start, I began receiving encouraging letters from readers, lists of LF loggings, and questions on how to improve one's reception. Interaction with readers has always been the best part of the job for me.

Nineteen years is a long time to focus on a particular portion of the radio spectrum, and I've seen some changes in the band during that time, but the changes actually go back decades earlier and include events of just the past few years. The story of how the LF band evolved from the dawn of radio to today's situation makes for an interesting study, indeed.

There isn't enough room to cover all of longwave history in a monthly column, or even a year's worth of columns, but we can take a timeline approach. I thought it might be interesting to mark some of the key events in longwave history, as a way of putting things in perspective for monitors like ourselves.

This will be a work-in-progress, so if you have things to add, feel free to send them along and we will update our timeline for a future issue. Nothing is out of bounds, as long as it's longwave related. Products, manufacturers, people, prominent stations, books, distance records, etc., are all welcome, so let's hear from you. The following is an attempt to get the effort started, but it is just that, a start. There is much more to add.

Longwave Timeline (Version 1.0)

- 1899** First wireless distress signal (CQD) sent on longwave from East Goodwin Lightship.
- 1903** First **2-way** wireless communication between North America and Great Britain takes place from a longwave spark gap transmitter.
- 1906** Distress call "SOS" approved by convention for use on ships. (CQD continued to be used for a number of years.)
- 1912** **Titanic** ship sinks. CQD and SOS calls are used. Longwave wireless plays key role in rescue of over 700 survivors.
- 1914** ARRL formed by H.P. Maxim W1AW, after a relay of his signals results in successful contact with a fellow amateur 30 miles away.
- 1921** The U.S. Maritime Radiobeacon System becomes operational with three spark gap transmitter sites, under jurisdiction of the Lighthouse Service.
- 1926** Rugby, England station GBR begins operation on 16 kHz. Active until 2003.
- 1934** The Communications act of 1934 creates the Federal Communications Commission (FCC).
- 1939** U.S. Coast Guard assumes responsibility Maritime Radiobeacon System. By the 1980s, more than 200 such stations are operating.
- 1957** Ground-based LORAN-C navigation service begins on 100 kHz, providing impressive 1/4 mile or better positioning accuracy, and repeatability of 600 feet or better.
- 1963** WWVB becomes operational, broadcasting a 7 kW signal on 60 kHz.
- 1963** Time station WWVL (20 kHz) begins operation. Decommissioned 1972.
- 1967** Arthur D. Watt's **VLF Radio Engineering** published by Pergamon Press. Considered the authoritative text on LW engineering practices to this day.
- 1968** Crystal controlled LOWFER transmitter article appears in **CQ** Magazine. Believed to be first such article highlighting the 160-190 kHz license-free band.
- 1972** First **Low and Medium Frequency Radio Scrapbook** published by Ken Cornell, W2IMB. Considered to be the end-all book of longwave experimentation. Lasts until the 10th edition in 1996.
- 1974** Longwave Club of America (LWCA) formed.

- 1983** Ralph W Burhans, famed engineer/longwave experimenter publishes classic series on LF/VLF active antennas.
- 1987** U.S. Coast Guard begins "modernization program" for radiobeacons, resulting in the eventual shutdown of sequenced beacon chains on the Great Lakes.
- 1987** Ground Wave Emergency Network (GWEN) active from 150-175 kHz. System ended in 2000.
- 1989** U.S. Navy Project ELF system becomes active on 76 Hz, with two transmitters; one in Wisconsin, and one in Michigan. Antenna length: 56 miles.
- 1990** U.S. Coast Guard makes plans to establish DGPS stations using old radiobeacon sites operating in the 285-325 kHz band.
- 1993** NAVTEX required for large vessels by 1993 Safety of Life at Sea (SOLAS) Convention.
- 1993** U.S. Air Force announces bid of contract for High Frequency Active Auroral Research Program (HAARP) in Alaska
- 1997** Ken Cornell, "Longwave Wizard" becomes a silent key after decades of contributions to the longwave experimenter community.
- 1997** OMEGA Navigation System (10-14 kHz) terminated.
- 1999** Ships no longer required to maintain a watch on 500 kHz, the International Distress and Calling frequency.
- 2006** FCC grants Part 5 experimental license WD2XSH to the ARRL, on behalf of amateurs investigating spectrum near 500 kHz.

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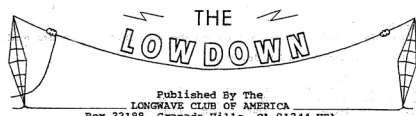
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❖ Mailbag

We are pleased to hear once again from Robert Homuth KB7AQD from Arizona, who writes, "Thank you for including my longwave loggings recently in *MT*. Sheldon Remington was kind enough to include my NDB loggings



Vol. 2 #1 Page 1

January, 1975

THE LOWDOWN is published each month by the Longwave Club of America to promote DXing on frequencies below 550 kHz and to further activities on the 1750 meter band. Dues are 12 legal size (4" x 9") stamped envelopes. (Note: if you send a check instead there will be a substantial delay in processing your membership). Headlines are the 20th of the month for loggings. Deadlines for the 1750 meter column will be set up as it grows. Reports of 1750 meter activity go to Ken Cornell, 225 Ballinger Ave, Ft. Pleasant Beach, NJ 08142. All other reports, articles, and correspondence go to H. John Clemmets, 11465 Albers #5, North Hollywood, CA 91601.

in his *West Coast NDB Checklist* since I was the only Arizona contributor back in 1986. The *Checklist* was hand written and photocopied, not typed nor word processed.

"Now, if I'm lucky, I can only copy local NDBs around Phoenix, and GLS-206 Galveston, TX under intense noise. But, back then, I could hear signals from the USA East Coast, up through Canada, and out to Hawaii, Hao Atoll, Sakhalin Island and Rarotonga using just an off-the-shelf Radio Shack DX-400 (Uniden CR2021) receiver and a wood frame loop antenna."

Robert also asks about submitting historic loggings for this column, and the possibility of having a "featured beacon" for listeners to try for. Robert, both of these are excellent ideas. As you can see from this month's column, history and longwave are closely aligned, and I always enjoy seeing notable catches made years ago, even if those stations are no longer active.

As for featured beacons, you made some suggestions, including GLS-206 kHz, Galveston, TX. That seems as good a place to start as

any, so how about it, *MT* readers? Can you hear GLS? How strong is it at your location, and what do you use for receiving gear? Let's see who can hear it from the farthest distance away.

To verify proper reception, please state the number of *complete* IDs from GLS in a 1-minute period. (This serves as a beacon's "fingerprint," because the number of IDs is unique to each station.) I look forward to hearing from our readers! By the way, loggings of any other stations you hear are always welcome; we are simply highlighting GLS with this challenge.

Rowland Hamly (MN) also wrote to *Below 500 kHz* with some loggings (see Table 1) and a question regarding availability of my CD and books on Longwave Radio. Rowland, I have produced three items related to longwave: A beacon directory called the *BeaconFinder II*, a narrated audio recording (CD or cassette) titled *The Sounds of Longwave*, and a published book (softcover) under the title of *Listening to Longwave*.

The first two items are available directly from me, and an advertisement for them appears at the back of this magazine. *Listening to Longwave* may be ordered from Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068-4113 (Tel. 1-800-431-3939). An online link to this book is available at (<http://tinyurl.com/LW-Radio>).

Listening to Longwave was a long-term project completed with Fred Osterman, President of Universal Radio, Inc. It had been a long time

since a new book on hobby monitoring of long-wave was available, so the time was right for a new release. The book is actually an update of an earlier tome called *The World Below 500 kHz* by L. Peter Carron. It contains dozens of new pages, charts, pictures and diagrams, as well as information on new operating modes.

❖ Loggings

Our loggings this month are courtesy of Robbie Spain (WY) and Rowland Hamly (MN). Each of these contributors is identified by their initials and state in Table 1 below. If you have loggings to share, please e-mail them to the address shown in the masthead, and try to follow the same general format shown below. Logs are printed as space allows, and they may be cross-posted to the LWCA journal *DX Downstairs* column, which I also edit.

TABLE 1. SELECTED BEACON LOGGINGS

FREQ	ID	LOCATION	BY
350	NYO	British Columbia	R.S. (WY)
358	BO	Boise, ID	R.S. (WY)
362	RPX	Roundup, MT	R.S. (WY)
340	ORB	Orr, MN	R.H. (MN)
346	YXL	Sioux Lookout, ON	R.H. (MN)
353	IN	International Falls, MN	R.H. (MN)
376	YAG	Ft. Francis, ON	R.H. (MN)
360	SW	Warroad/Swede, MN	R.H. (MN)
413	YHD	Dryden, ON	R.H. (MN)
209	IB	Arikokan, ON	R.H. (MN)
248	WG	Winnipeg, MB	R.H. (MN)

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Digital Signal Processing Solutions

This month, we'll explore the differences between software that does digital signal processing (DSP) at audio frequencies and hardware implementation of DSP at intermediate or radio frequencies (IF or RF). We'll also review a commercially available and inexpensive software program for audio DSP.

Radios with digital signal processing generally offer you these features:

- Variable bandwidth filtering
- Noise reduction
- Auto-notch (for SSB)

Although DSP can clean up signals to the point that you can barely hear some types of noise, there are several things that can make it unpleasant to listen to:

- A perceptible delay between real-time audio and processed audio
- A feeling that you are listening to a signal at the end of a barrel that causes signals to sound somewhat muffled
- A "watery" sound

Some modern rigs have DSP that is always on, which means that even if you wanted to, you could not turn it off. A better choice is a radio that allows you to decide if you like the sound of DSP and then enable it only if it truly seems to help.

❖ Dynamic Range

Many radio manufacturers have chosen to develop custom algorithms implemented in hardware DSP chips. One commonly used family of parts is the Analog Devices "Sharc" processors. The ADSP-2100 family used 16-bit processing, while the newer ADSP-21160 family has 32-bit processing and instruction execution speed of 100MHz (with a sustained speed of 380 million floating point operations per second [MFLOPs]).

The number of bits is important, because there are many mathematical algorithms being executed, and roundoff errors can accumulate if there are not enough digits of internal resolution. The speed is important because there is only a short time between incoming samples to perform the complex math functions needed to create filters and do noise reduction.

Internal data handling resolution should not be confused with the number of bits of digital data being fed into the processor. Typically, the analog information is sampled with an analog to digital (A/D) converter that is generally only 16-bits, and this translates directly into dynamic range.

Dynamic range is the range of signal strength that can be handled by a device, from weakest to strongest. For example, if you had a signal that ranged from zero to 5 volts, and you sampled it with an 8-bit A/D converter, you

would have $5V/256 = 19.5$ mV per bit of signal detection capability, or $20 \log(1/256) = 68$ dB of dynamic range. If you used a 16 bit A/D, you would have $5V/65536 = 76$ microvolts per bit, or $20 \log(1/65536) = 96$ dB of dynamic range.

So, the more bits, the better. But there is a point of diminishing returns. Suppose you sampled that same 5V signal with a 32-bit A/D. This would give you a theoretical $5V/4,294,967,296 = 1.2$ nanovolt sensitivity, resulting in 192dB of dynamic range. In practice, this is impossible to achieve with real parts on a real circuit board. Noise from digital circuits, ground loops and externally induced noise would quickly render most of those extra bits meaningless. And even if you could actually build a board that quiet, the cost of a 32-bit A/D would be prohibitive. Besides, at IF frequencies, 96 dB of dynamic range is more than adequate.

❖ Where to put the DSP?

There are three places one can put digital signal processing in a radio receiver:

- Audio (0 to 20 kHz)
- IF (10 kHz to 10 MHz)
- RF (0 to 30 MHz for HF receivers)

Until recently, audio was the only place one could do DSP, because the microprocessors simply could not execute fast enough to perform the required math on incoming data. Audio processing has two drawbacks – 1) interfering signals and internally generated noise have already had a chance to be mixed and amplified, so there's more to clean up, and 2) such processing by nature has to occur outside the receiver's AGC loop, so any improvement in the signal cannot be used to attenuate or amplify the overall receiver gain.

Processor speeds have increased dramatically in recent years, allowing signals to be processed at any of the receiver's IF stages. Thus, a purely analog receiver can still apply DSP to signals once they have been converted to a fixed frequency that is low enough to allow math operations to be completed between samples of the signal.

A Software-Defined-Radio (SDR) does the ultimate – it samples the RF directly and performs not only DSP, but *all* receiver functions via software or firmware. However, to get the desired dynamic range of over 120 dB with sensitivity around -140dBm, these radios must feed more bits into the processor – usually 24. This is why such radios generally cost more – the parts to get this kind of resolution are still expensive.

❖ Hardware Versus Software DSP

If a receiver implements hardware DSP, it is using custom firmware in chips that will certainly become obsolete and possibly even unavailable in the not-too-distant future. This is one reason many people are reluctant to buy such a radio. It's a little silly, though. When a radio is in active production, the manufacturer is obligated to provide support. Many years later, when it is no longer possible for a manufacturer to get parts necessary to support the radio, a malfunctioning unit is simply disposed of or used for spare parts.

This has always been the case. For example, while it is still possible to repair boatanchor radios made in the 1950s, many of the parts are getting harder and harder to find. Eventually, these old radios will simply be museum pieces, just as many radios of the '30s are today. In fact, as digital technology progresses to the point where radio broadcasts no longer use AM, CW or SSB, the old sets will not be usable at all, kind of like analog TV sets.

One solution preferred by many is software based DSP, which allows the desired signal to be processed in software running on a PC instead of in custom algorithms running on a microprocessor. There are two methods in common use for this. Some Software Defined Radios digitize the RF spectrum with a fast A/D and send the data to a PC via a high-speed bus where software routines using open source algorithms perform DSP and other receiver functions.

Another solution is Audio DSP. Although the problems mentioned above for Audio DSP solutions are still true, the radio itself may be serviceable longer, since it uses no custom parts that may become obsolete quickly, and you can turn off the DSP if you don't like the way it sounds.

❖ ChromaSound

A very inexpensive solution using Audio DSP is made by Silicon Pixels. Their product is called ChromaSound. For \$50, you can simply feed your receiver audio into your PC's sound card, run this software, and then hear and see the effects of DSP. In fact, running your rig's audio through a PC and then out to amplified speakers can sound pretty good even without DSP enhancement! It harkens back to the days when everyone had big loudspeakers and the rich sound of wideband AM came booming through.

ChromaSound uses 64-bit floating point math internally, an advantage of using the PC architecture to best advantage.

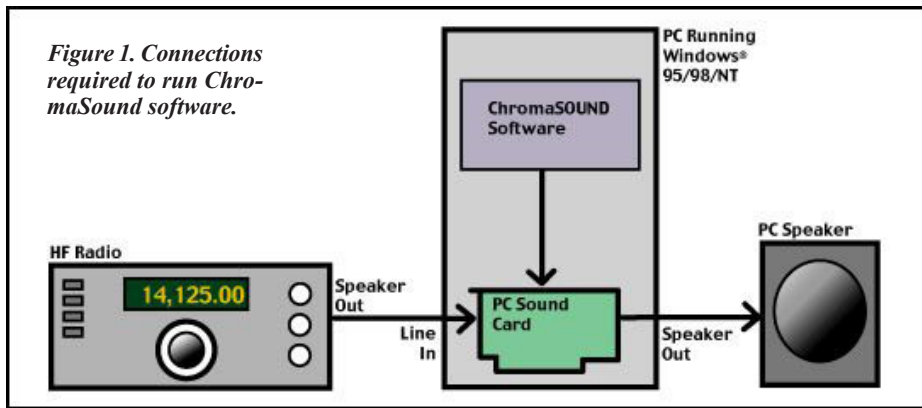


Figure 1. Connections required to run ChromaSound software.

Figure 1 shows how it works.

ChromaSound is specifically designed for HF communications use. Like many other PC applications these days, it uses your PC sound card or onboard sound chip to capture, process and output the processed audio.

As a specialized application, ChromaSound offers a wide variety of standard DSP filters, namely, high-pass, low-pass, band-pass and band-reject. It also supports three different levels of SSB noise reduction, as well as an automatic notch filter and Automatic Gain Control, or AGC.

One of the features that separates ChromaSound from other DSP systems is the Filter Designer. By moving the various sliders on the screen, you can visually track changes you make in the low frequency cutoff, high frequency cutoff, filter skirt "width" and the desired rejection. Figure 2 shows how several of these sliders are displayed in the program, as well as their associated values.

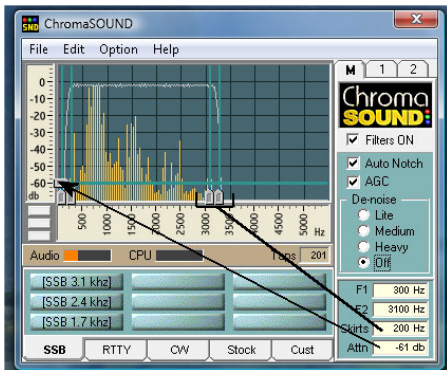


Figure 2. ChromaSound screen showing location of sliders to adjust filter parameters.

Once you've designed a filter (or modified one of the "stock" filters), you can save it by clicking down and holding the left mouse button inside the "gridded" part of the window, dragging the mouse to an empty or unlabeled filter selector button, then releasing the mouse. A window will appear asking you to name the filter. Once done, the filter is saved and available for future use. To erase or delete a custom filter, simply right-click on the desired filter selector button then answer "Yes" when prompted if you want to erase the file.

ChromaSound was originally designed by Jim Barber, N7CXI and William Montgomery,

VE3EC in 1999 as part of an early series of experiments into using Windows PCs for radio signal processing uses. Although it's been around a while, it installs and runs on all current versions of Windows. Unregistered "shareware" versions will run for thirty minutes at a time and then close. The author's address provided in the program and documentation is no longer accurate, but is available at Jim's Silicon Pixels website at www.barberdsp.com.

❖ HD Sound Cards

When I first heard that HD sound cards were coming out, I thought perhaps that applications like ChromaSound would get even better. But alas, it is not really true. High Def sound cards have supplanted the former industry standard "AC97" spec. These are cards and computer motherboards using chips that claim to have faster sampling speeds (192 kHz versus the older 48 kHz), more bits (32 versus the older 16-20 bits), and more output channels (8 versus the older 6) that can handle the common multi-channel surround sound systems.

However, reality is different from marketing hype. Truth be told, no AC97 soundcard ever shipped that actually supported more than 16-bit sampling, and no high-def soundcard has ever shipped that supports more than 24-bit sampling. Most just run at either 44 kHz or 48 kHz at 16 bits. Unfortunately, poorly designed motherboards and soundcards can introduce enough noise that the system still has only about 96 dB of dynamic range, and sometimes much less (as low as 60 dB on the recording inputs and 86 dB on playback).

Current sound cards in the \$50-\$100 USD range have signal to noise ratios that reach (and

in some cases exceed) 100db, allowing full use of the 96db dynamic range equated with 16-bit audio applications like ChromaSound.

Sound cards in the \$20-\$49 USD range vary widely in quality, both in audio terms and in the quality of the supplied device driver software.

❖ Impressions

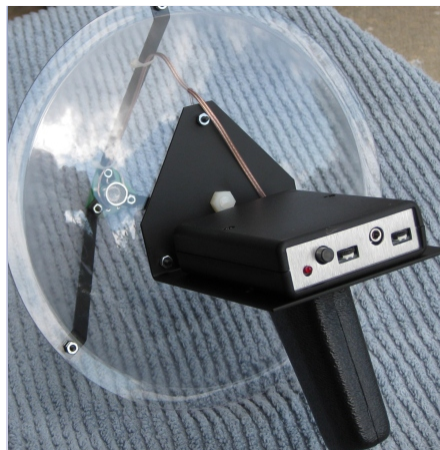
As with most DSP implementations, ChromaSound has some artifacts that can be annoying at times. It is perhaps most noticeable when using the "De-noise" functions. If the signal level is too loud, you need to use the volume control in your soundcard to lower the line input level.

You can also use the Automatic Gain Control (AGC) setting, but remember that if the signal is distorted coming into the soundcard, the AGC will not be able to "fix" it. This AGC is outside your radio's internal AGC loop, so any gain reduction applied will not be reflected back to the front end of your receiver. This dual AGC (one from your rig and one in ChromaSound) can result in signals getting suddenly louder or softer. I found that it was usually necessary to keep the volume control on the screen along with ChromaSound and adjust them both for best audio.

The Auto Notch function works very well to eliminate heterodynes – both receiver-generated (birdies), and those on the bands (people tuning up nearby). Just be sure not to use it when listening to CW. The first time I did that, I wondered why the CW signals would appear to start and then get severely attenuated. It sounds very strange!

Since ChromaSound takes the audio output of your rig and processes it, there is a perceptible delay between the "real-time" audio coming from the rig's speakers and the processed audio coming out of your PC. If you have the PC's line out feeding into your rig for digital mode transmission and you have enabled it to go to your rig's speakers, you can get the system into a feedback loop that sounds like an echo chamber, so be sure to disable the line-out to your rig when using ChromaSound.

On rigs that have hardware DSP, adjusting the filter response is not something you can do to the extent offered by ChromaSound. It's a neat program. If you've been wondering what all the fuss is about DSP, this program would be a great way to learn.



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FUN WITH LOOPS

Low-Frequency Listening Made Easy

I've noticed that my column is revealing an unmistakable bias for ham operation between 160 and 6 meters. In the excitement of chasing rare DX, catching the odd bits of weird propagation on 10 and 6 meters, and ragchewing with all my friends on every band, I sometimes forget that most of us also enjoy the passive, "listener-only" aspects of our hobby.

I've been a shortwave listener even longer than I've been a ham – I can still recall the incredible thrill of listening to Radio Havana, HCJB in Ecuador, and Radio Nederland on a one-tube regenerative receiver I built on an old chassis when I was ten years old. And as we go along, I'm sure we'll look at more antennas for the SWL. To a large extent, though, I've provided a bunch of good shortwave antenna ideas already, by default, since all the ham antennas I've talked about making great SWL antennas, too, especially with a good tuner.

So, my friends, this month I'd like to talk about an antenna for an under-appreciated part of the listening spectrum – everything under 1.8 MHz (the bottom of the lowest ham band, 160 meters). As we go down the dial, this encompasses the AM broadcast band, 550 to 1700 kHz, which I'll call hereafter "BCB"; longwave, usually construed as about 100 to 500 kHz or so, "LW"; and everything below LW, which can be thought of as "VLF" or very low frequency.

BCB is the easiest to access – surely everyone has the AM band on home stereo, car stereo, clock radio, or somewhere around the house. LW is likely to be present on most "general coverage" receivers and transceivers nowadays, and even many older radios cover some or all of this band. VLF is the tough one here; there's not much in the way of commercial equipment for listening down this low, though I've seen numerous kits and circuits for VLF receivers or converters over the years.

❖ Long Waves = Long Antennas

The conventional antennas we've looked at over the months become impractical at these low frequencies, due to their immense size: for example, a halfwave dipole for 1080 kHz, in the middle of BCB, is 433 feet long! Even a quarterwave vertical would be 217 feet tall. Down in LW it gets even sillier. A dipole for 200 kHz would be 2340 feet long – almost half a mile.

Fortunately, someone figured out many years ago that a length of wire can be wound in an open loop to serve as an antenna at these low frequencies. Older AM "table radios" had this

loop wound on the inside of the back cover of the radio. When pocket transistor radios came along, the loop was wound on a short stick of ferrite rod, which increased its inductance and allowed the coil to serve as both antenna and as the inductive part of the tuning circuit.

This loop wound on a stick of ferrite rod, by the way, was commonly called a "loopstick." It was installed inside the pocket radio and gave these little rigs a neat, antenna-less appearance. Even now, a loop antenna for AM listening comes with the purchase of a home stereo system, for connection to antenna terminals on the rear of the stereo. (See photo.)

This small loop – about five inches in di-



The AM loop that came with the author's home stereo system. (Photo by author)

ameter – is adequate for local BCB stations. At night, you can even hear stations from greater distances under the right conditions. But to do any real DXing on BCB and to sample the world of LW, we need something a little more robust. So I took stock of what scrap lumber and leftover wire I had around the house, and came up with this month's antenna: a homemade loop of tabletop size. (See photo.)

❖ Tabletop Loop Construction

I made the "X" brace from two 24" lengths of 1"x2" lumber screwed together at their centers. Then I cut the four arms that the loop is wound on – two 4" pieces and two 4-3/4" pieces, since the brace lengths are offset by the thickness of a 1"x2". I pre-drilled the holes to screw these arms onto the brace to prevent splitting the wood.

On the arm that became the base of the loop, I drilled a hole in the center of its joint with the brace, large enough to fit over a deck screw. I then ran a 3" deck screw through the center of

a square piece of 2"x10" to form the base, and set the hole drilled in the "bottom" foot on this screw. This gives us a frame that can be pivoted on its base, an important feature, as we'll see later.

Next, it was time to wind the loop of wire onto the frame. I found a good-sized spool of *bell wire* in my stash of odds and ends and decided to use it. Bell wire is a pair of #20 solid wires, one covered with red insulation and one covered with white, that has been used for many years to run doorbell wiring inside the home. I wrapped the free end of the pair a few times around the base arm to secure it, leaving eight inches or so hanging free to connect to, and commenced winding the paired wires around the frame, on the arms. I wound twenty turns, and the tape measure showed that the frame circumference was 74", so I had wound a total of 123 feet of the paired wire onto the loop. I wrapped this end around the base arm a few times to secure it, cut off the wire, leaving about eight inches again to connect to, and the loop was done!

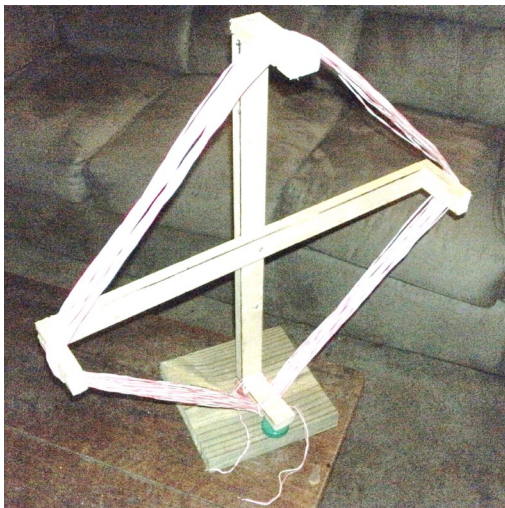
Oops, not quite. I hadn't allowed for the need to space the loop off of the base to allow for the wire now wrapped around the frame. A hole drilled in a plastic bottle cap to form a spacer on the deck screw between the base and the frame, and a second plastic bottle cap glued to the front of the bottom arm to level the assembly, completed the antenna.

Now it was time to do some test driving. I connected a short length (about two feet) of ladder line to the loop with wire nuts, and the other end to the BALANCED input of my MFJ 969 tuner. Then I realized that the tuning function would not be much help at these low frequencies, since the bottom of the tuner's range is rated as 1.8 MHz. So I switched the tuner's selector to "balanced line – bypass," which meant I was really just using the tuner's 4:1 balun and coax connection to my radio. As we'll see, though, it all worked out just fine.

❖ Tuning Around...and Down

On my Yaesu FT-897D transceiver, I've got one band always set to 5 MHz in AM mode to monitor WWV. It would be simple to tune down from here to BCB and LW, so I turned on that band setting. WWV came roaring in, strong and clear. Down at 2.5 MHz, WWV was even louder, easily reaching S9. And this was with the loop in the basement, where my ham shack is.

When I reached BCB, pandemonium broke loose. It was 2 am local time, and AM stations



The homemade loop antenna, ready to pull in long-wave DX. (Photo by author)

from all over the nation came rolling in, every 5 kHz, all the way down the dial. I experimented with swiveling the loop on its pivot and found that the antenna has definite directional properties. I couldn't hear much on LW, though, so I toted radio, power supply and loop upstairs to the dining room table, to put the loop some feet above ground.

Let me tell you that there are *all sorts* of cool things to listen to on LW. I had never explored this band before and am quickly becoming a huge fan. There are odd-sounding military data transmissions, another AM broadcast band

used by other countries (in Europe and Asia), frequencies for hams and experimenters, and beacon stations, to name just a few. Check out Kevin Carey's excellent monthly column here in *Monitoring Times*, called "Below 500 kHz", for everything you need to know to get you started (and hooked on) listening to LW. You can also find some info by Googling "longwave"; there are several sites devoted to this very interesting band.

Be aware that on LW the loop will pick up a lot of power line and other "loud hum" interference, and rotating the loop to null these interferences becomes an art in itself. Also, as is true on BCB and the lower end of the shortwave spectrum, nighttime and the fall and winter seasons will provide the most productive times to listen. Propagation falls to absolutely nothing during the day, and at night, atmospheric and other noise is overwhelming during the spring and summer. You can still listen profitably during these times – it's just not nearly as easy.

Also, don't overlook the fun of DXing on BCB. It's a blast trying to log an AM broadcaster in as many states as you can, or from the greatest distances possible. And feel free to experiment with loop construction – the size of the loop, the amount of wire, etc. If you Google "loop antennas" you'll find many interesting loop construction projects.

That's all for this month, friends. Next time we'll delve ever deeper into the world of antennas. Happy operating!

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The Revolution Has Begun: The Uniden HomePatrol-1™

By Larry Van Horn, N5FPW, MT Review Editor

"We left a lot of people behind in today's scanner market and we know it," said Paul Opitz, Uniden America's Product Manager, during a recent interview with *Monitoring Times* magazine.

Opitz was referring to all the people who would like to own and listen to scanners, but who have been locked out due to the complexity of the current crop of scanning radios. "These are people who hear the sirens going off in their neighborhood and they want to find out right now what is happening," Opitz said. The convoluted procedures required for modern scanner operation are a direct cause of diminishing scanner sales over the past several years.

For Uniden, while the lower scanner sales figures were easy to compile, fixing the problem was not so easy. As Bill Dorr, a Senior Vice President at Uniden America, recently said, "Simplicity is hard to achieve."

"That is why we have taken a hard look at how we could get them [the hobbyists left behind] back, and our answer was the HomePatrol-1," Opitz said.

❖ Why are scanners so complex to program?

Many years ago, with the advent of trunking radio systems, P25 digital voice, and other technological advances, communications crossed a technological threshold beyond which many scanner hobbyists never dared venture, not even to continue listening to their local public safety agencies. Gone from the vocabulary of the radio hobbyist were terms such as channels, banks, and "enter" key; nor could they just punch in a frequency, hit the ENTER button and listen to local public safety communications.

Because the communications had gone high tech, the radio monitoring hobby unfortunately had to go high tech as well. In order to stay in the game, we've had to wrestle with programming concepts such as GRE's Object Oriented programming and Uniden's Dynamic Memory Allocation (DMA) scanners. We've had to learn about Motorola, EDACS and LTR trunk radio systems (3600 baud/9600 baud/ESK, etc.), P25 digital modulation, talk groups, NAC/DCS and PL tones, and all sorts of things that confuse and discourage many radio hobby-



ists.

But, the most common complaint that radio hobbyists voice about modern scanner technology is that "They are 'way too complicated to program and operate for the average Joe," and, "You darn near need a college degree just to hear the local dog catcher!"

This dilemma has been borne out in *MT* as well. I know many readers have lamented the difficulty of operating scanner equipment and have felt left behind in the wake. In review after review of scanners in *MT*, we have documented that setting them up and operating these radios isn't easy. We always recommend that you spent a lot of time with the owner's manual, and that you practice programming the examples from the manuals to become familiar with using these technological marvels.

❖ So why is the HomePatrol-1 a revolution?

What is so revolutionary about this new scanner? To take a page from Bill Dorr's play book, Uniden has finally achieved simplicity in programming with this scanner. There has never been a scanner like it before. Saying that it will be easy to program by the user is actually an understatement.

While there are several ways you can program a HomePatrol-1, the easiest way is by just punching in five numbers and pressing Enter on the touch screen (well, actually the ACCEPT button). That ought to make a few of you old timers a little more comfortable already.

At its most basic level, the only thing you will need to know to program a HomePatrol scanner is – the *ZIP code* where you are currently located! Yes, punch in your five digit ZIP code on the LCD touch screen, press ACCEPT, and the scanner loads your local frequencies from a database stored within the unit. After that is done, you should hear your local scan-

ner communications (conventional and trunked, analog and digital). No other operator interface is needed and it is truly just that simple.

If you don't know the ZIP code of the location you want to monitor, you can also punch in the city and state on the touch screen. In addition to these two methods, there are currently two more ways to program the HomePatrol-1: more on that below.

❖ Where do the frequencies come from?

The engine that drives this little scanning marvel is the **RadioReference.com** website. Unless you have been living on another planet for the last few years, most scanner enthusiasts with Internet access are familiar with RadioReference. They are the world's largest radio communications data provider, featuring a complete frequency database, trunked radio system information, and FCC license data.

A couple of years ago, the administrators at RadioReference embarked on a project to assign specific location information (known as a geotag) to all radio systems/frequencies in their online database. A geotag consists of latitude, longitude, and range. This tag describes a circle centered at the latitude/longitude that fully encompasses the political entity (i.e. city, town, state, etc.) served by that radio system. Each of these circles in the RadioRef database also includes all the radio system information (frequencies, descriptions, tags indicating how each channel is used, etc).

By punching in your ZIP code HomePatrol-1 sets your location somewhere within 10 miles of the center of that ZIP code. While that is not very precise, it will be good enough to catch local communications. HomePatrol-1 will then select channels from its online database stored on a 2 GB micro SD card for all of the radio systems that overlap your approximate location.

But, using the ZIP code is not the only method of getting information loaded into HomePatrol-1. Each method for selecting your location uses a different sized circle. In addition to the 10-mile Zip Code radius, HomePatrol-1 is able to use the following circle sizes:

- 20-miles radius from the center of a city when using city selection.
- 30-miles radius from the location of the dis-

- covered radio tower when using Auto Locate.
- Zero mile radius if you connect a GPS or manually enter your latitude or longitude.

Right now you are probably scratching your head: zero miles? Yes, that means that the scanner knows your precise location. So, in order for a radio system to be selected, that system would have to provide coverage/service to the precise location you have entered into the scanner.

For instance, if you are traveling and you use a GPS to feed precise location information into the unit, HomePatrol-1 will automatically select and deselect systems as you drive through each system's coverage zone. There's nothing extra to scan, program in advance, or deselect as you travel down the highway.

If you want to hear more (or less) than what the HomePatrol-1 selected, you can manually change the range setting to be bigger (to include more systems) or smaller (to include fewer systems). This is done from the main screen by tapping RANGE and adjusting the range up or down. Just keep in mind that if you are not using GPS, the range will be from the center of the ZIP code or city you have entered, or your closest radio tower location, not your precise location.

Because there are so many different kinds of communications going on, you can turn on specific types of agencies you want to hear and turn off those you don't. Maybe you don't want to monitor civilian or military air communications, just police, fire and EMS. No problem: touch the screen to set up what you want to hear and it is done. Table One has a list of the various service types that can be selected or deselected using this unit.

In a nutshell, there are no banks, no systems, no groups, no programming of frequencies to fiddle with; your location is all you need to get you started.

❖ It's what's under the hood that counts.

HomePatrol-1 operation centers around its touch "main screen." From this screen you can select and manage the transmissions you listen to, as well as set the framework for how HomePatrol-1 operates (volume, backlighting, squelch levels, etc.).

There are four databases that are stored within the HomePatrol-1 unit and each can be updated by the user at no cost.

- Radio System Database – provided by www.radioreference.com. This database contains radio system information including frequencies, trunked talk groups, and geographic locations for radio systems across most of North America. This database is stored on the card inside the unit and is updated regularly via a computer connected to the Internet.
- ZIP code Geographic Database – provides geographic coordinates for every ZIP code in the U.S. and every postal code in Canada.
- RadioReference SysID Database – contains system ID and geographic location information for trunked radio systems across North America, used with the Auto Locate feature.
- City Location Database – includes the center point of most named cities and counties.

Some of the other tools in HomePatrol-1's feature set include:

- Radio systems: APCO 25 Digital Trunked and Conventional, Motorola Analog and Mixed Digital, EDACS Narrow and Wide, LTR, and conventional frequencies.
- 2 GB micro SD for storing favorites lists and recording transmissions. It is factory programmed for all known radio systems in the United States and Canada.
- Auto-locate that can quickly find local systems even if you don't know where you are.
- USB connection to PC for database and firmware updates through HomePatrol-1 Sentinel software.
- Weather Alert Standby (SAME).
- Optional car mounting kit.

As you listen to HomePatrol, you'll find that there are certain channels you want to listen to more frequently. You can create a specialized list and save these channels to it. For example, you can create a list entirely

TABLE ONE: HOMEPATROL-1 SERVICES TYPES

Note: Not all service types are available in all areas and this list may change from time to time by Uniden and RadioReference.

Service Type	Description
Aircraft:	For civilian aircraft and air traffic control operations most typically in the 118-136 MHz and 225-380 MHz bands in AM mode.
Business:	Most business related entities not covered by other tags.
Corrections:	Jail/prison operations and other corrections activities, including federal prisons.
Emergency Ops:	Emergency Operation Centers and similar emergency management or disaster related operations.
EMS Dispatch:	Ambulance dispatch, including rescue squads.
EMS-Tac:	Ambulance on-scene communications, tactical operations and secondary channels.
EMS-Talk:	Ambulance talk-around, car-to-car and supervisor operations.
Federal:	All federal government operations (except corrections, traditional law enforcement patrol and fire/EMS operations).
Fire Dispatch:	Fire dispatch, including combined fire/ambulance dispatch.
Fire-Tac:	Fire ground, tactical and on-scene communications, including combined fire/ambulance operations.
Fire-Talk:	Fire talk-around and car-to-car operations, chiefs, supervisors, etc., including combined fire/ambulance operations.
Ham:	Any amateur radio assignment.
Hospital:	Ambulance-to-Hospital communications and patient reports.
Interop:	Interoperability communications, cross-agency communications, mutual aid, etc.
Law Dispatch	Law enforcement dispatch.
Law-Tac:	Law enforcement tactical, SWAT, on-scene, surveillance and specific sub-agency communications.
Law Talk:	Law enforcement talk-around, car-to-car and supervisor operations.
Media:	Newspapers, television and broadcast radio operations.
Military:	Military operations, e.g., range control, air-to-air combat, etc.
Multi-Dispatch:	Combined law enforcement and fire/ambulance dispatch.
Multi-Tac:	Combined law enforcement and fire/ambulance tactical and on-scene communications.
Multi-Talk:	Combined law enforcement and fire/ambulance tactical talk-around and car-to-car operations.
Public Works:	Public agency non-public safety communications. This includes any non-public safety government services, such as trash, streets, roads, sewer, zoos, administration, maintenance, animal control, community initiatives, code compliance, etc.
Railroad:	All common carrier railroad communications.
Security:	Non-law enforcement security operations, including private security companies, noncommissioned government agency security, school security, etc.
Schools:	School-related communications (schools, school buses, football games, etc.).
Transportation:	Public and private bus, taxi, and public passenger rail communications.
Utilities:	Private electric, water, natural gas, phone, cable TV, etc. operations.

of police department dispatchers, emergency operations, or a specific city's transmissions. If there is a special event coming up, like an air show or car race, you could create a list just for that event.

As you find transmissions you like and would like to monitor again, you can save them to a favorites list. When you opt to listen to a favorites list, HomePatrol-1 will monitor only the transmissions on that list.

You can also select transmissions for HomePatrol-1 to avoid (ignore). This is the



TABLE TWO: HOMEPATROL-1 SPECIFICATIONS

Display:	Standard 3.5-inch Hi Color LCD (65K) with backlight QVGA 320 X 240 (3.5 inch)
Touch Panel:	LCD with Touch Panel
Controls/Switches:	Power On/Off, Volume Control, Reset Switch
External Jacks/Slots:	ANT. Jack - SMA Type Phone Jack - 3.5 mm (Stereo Type) - 32 ohm (Stereo headphone) - 64 ohm (Earphone) Line Out Jack - 2.5 mm (Stereo Type) - 600 ohm for Audio Output DC Power Jack - EIAJ Type-3 (Center Positive) GPS Interface Jack - 4-pin Mini Type (RS232C) USB Jack - 5-pin Mini USB Type Memory card Slot - MicroSD Type
Internal Speaker:	8 ohm. 2.0 W Max
Power Requirements:	4 x AA size Rechargeable NiMH Batteries (2300mAh) (included) 4 x AA size Alkaline Batteries (not included) or AC Adapter (AC 120V 60Hz 9V 800mA Regulated) (included) DC Adapter (DC 12V to DC 9V 800mA Regulated) (included)
Operating Temperature:	+14° F (-10° C) ~ +140° F (+ 60° C)
Storage Temperature:	-22° F (- 30° C) ~ +140° F (+ 60° C)
Size (mm):	3.3 in (84.5) H x 5.9 in (149) W x 1.5 in (38.4) D (Without antenna)
Weight:	15.9 ounces with battery and antenna, 10.8 ounces without
Accessories:	AC Adapter (9V 800mA DC Out) DC Adapter (9V 800mA DC Out - Cigarette Lighter type) AA size NiMH Rechargeable Battery (2300mAh x 4) Rubber antenna (SMA type) USB cable (USB A to USB Mini B Type) MicroSD Card (2GB) Desk Use Bracket (Stand Type)
Scanning Speed:	100 Channels/Second (maximum)
Trunk Tracking:	Motorola Type I 800 Motorola Type II 800, 900, UHF, VHF EDACS Wide, Narrow LTR APCO P25

same thing as lockout for the old timers.

HomePatrol-1 also has a feature that acts as an instant replay of the transmissions you've just heard. You can set how long a period replay will record for instant playback, ranging from 30 seconds to 240 seconds (four minutes). While you can replay that recording immediately and continue replaying it, you cannot save it for future listening.

On the other hand, with HomePatrol-1 you can tap a button and begin recording the transmission you're listening to. When you begin recording, HomePatrol-1 will add the replay recording buffer to the recording and stores the whole thing on the micro SD card inside the unit. You can record up to 1,000 sessions, but HomePatrol-1 stops recording when SD card memory is down to 512MB.

❖ What's in the box?

There is a lot of bang for the buck in this box. In addition to the unit itself, there is an antenna, AC Adapter, DC cigarette lighter car adapter, plastic desk stand, USB computer interface cable, a printed quick reference guide, and four NiMH (AA) batteries.

Once the scanner is powered up and interfaced to a computer using the USB cable, the user can download a full operator's manual (pdf format) and install the HomePatrol Sentinel software. This software will ensure you are using the latest software and database. HomePatrol will appear to be an additional drive on your system.

For more information and customer support, you should also visit Uniden's exclusive address for everything HomePatrol at www.homepatrol.com/.

❖ Overall rating and final thoughts

No *First Look*, review would be complete without some complaint on my part, so let's get that out of the way first.

I would like the ability to customize the main frequency list in this scanner and not have to rely solely on RadioReference. In its current configuration, HomePatrol-1 and its Sentinel software will not let me

do that. My discussions with Uniden indicate that could be an option sometime after the initial release of the unit, probably early next year.

I have really been sold on the Uniden Close Call technology over the last few years and would like to have seen it included with this unit, but since I own several other scanners with that feature, I can live without it – not that we have a choice.

The biggest issue with this radio is the battery drain. In our test we got about four to five hours of battery life, depending on how much radio traffic was received. I'm glad to see that they did include a cigarette lighter adapter for the car and an AC adapter. The former will help during long trips.

It is not often that I have seen a radio approach the level of perfection, but this one is certainly close. Sensitivity was excellent, and was even better than my BC-246 and BC-396D scanners as measured on the bench. It scans fast, is well engineered, and it is a great all around scanner for both home and vehicle.

For years, scanner hobbyists around the world have wanted to have their cake and eat it too. We wanted to be able to monitor complex trunk systems, but we didn't want to have to have to learn about them to hear them. We just wanted something simple to use that would let us listen to the complex world of communications that surrounds us. Unfortunately, simple just wasn't easy any more in the world of scanner radios.

But that has all changed. Uniden's new HomePatrol-1 scanner

has fundamentally changed the face of scanning forever. Not many things in this world can be called true game changers, but the new HomePatrol-1 is the exception and has indeed made scanning simple again.

The Uniden HomePatrol-1 (SCN 55) is available from Grove Enterprises (1-800-438-8155 or <http://www.grove-enterprises.com>) for \$499.95 plus shipping and handling.

MT FIRST LOOK RATING (0-10 SCALE)

Audio Quality	10
Audio Levels	10
Backlight/Display	9
Battery Life	6
Ease of Use	10
Feature Set	8
Keyboard/Button/Control Layout....	9
Overall Construction	10
Overall Reception	8
Owner's Manual.....	9
Sensitivity.....	9
Selectivity.....	9

Overall rating: 4 and 3/4 stars

**TABLE THREE: HOMEPATROL-1 FREQUENCY COVERAGE**

Frequency (MHz)	Modulation	Step (kHz)	Remarks
25.0000-26.9600	AM	5.0	Petroleum Products & Broadcast Pickup
26.9650-27.4050	AM	5.0	CB Class D Channel
27.4100-27.9950	AM	5.0	Business & Forest Products
28.0000-29.6950	NFM	20.0	10 Meter Amateur Band
29.7000-49.9950	NFM	10.0	VHF Low Band
50.0000-53.9950	NFM	20.0	6 Meter Amateur Band
108.0000-136.9950	AM	8.33	Aircraft Band
137.0000-143.9950	NFM	12.5	Military Land Mobile
144.0000-147.9950	NFM	5.0 2	Meter Amateur Band
148.0000-150.7950	NFM	12.5	Military Land Mobile
150.8000-161.9950	NFM	5.0	VHF High Band
162.0000-173.9950	NFM	12.5	Federal Government
174.0000-215.9950	FM	5.0	TV Broadcast 7 – 13
216.0000-224.9950	NFM	20.0	1.25 Meter Amateur Band
225.0000-379.9950	AM	25.0	UHF Aircraft Band
380.0000-399.9950	NFM	12.5	Military Band
400.0000-405.9950	NFM	12.5	Miscellaneous
406.0000-419.9950	NFM	12.5	Federal Government Land Mobile
420.0000-449.9950	NFM	12.5	70 cm Amateur Band
450.0000-469.9950	NFM	12.5	UHF Standard Band
470.0000-512.0000	NFM	12.5	UHF TV
758.0000-787.9950	NFM	6.25	Public Service Band
788.0000-805.9950	NFM	6.25	Public Service Band
806.0000-823.9875	NFM	12.5	Public Service Band
849.0125-868.9875	NFM	12.5	Public Service Band
894.0125-960.0000	NFM	12.5	Public Service Band

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The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1,240,000 MHz.-1,300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

Close Call Radio Frequency Capture - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.



Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,9800 MHz., 400,000-512,000 MHz., 806,000-823,9875 MHz., 849,0125-868,9875 MHz., 894,0125-956,000 MHz., 1,240,000 MHz.-1,300,000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group



ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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AOR AR16BQ Wide Band scanner with quick charger.....	\$199.95
AOR AR3000AB Wide Band base/mobile receiver.....	\$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver.....	\$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner.....	\$594.95
AOR AR8600 Mark II Wide Band receiver.....	\$899.95
AOR AR-ONE Government/Export sales only 10 KHz-3 GHz.....	\$4,489.95
Scantcat Gold For Windows Software.....	\$99.95
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RADIO RESTORATIONS

BRINGING OLD RADIOS BACK TO LIFE

Marc Ellis, N9EWJ

marcellis@monitoringtimes.com

Starting up a Vintage Radio

Last week I sent in the September column introducing the Philco table model broadcast set that is to be our next restoration project. Under normal conditions, the October column you now have in your hands would report on the first steps in the restoration of that radio. However, it turns out I'll be away from home for most of the month of August, when I would ordinarily be putting together this column.

Instead, I'll have to submit a column before I go – or there will *be* no October "Radio Restorations!" Since I haven't had time to do enough on the Philco to discuss with you, I'll need to take another approach. This will be a special column dealing with the first steps to take in bringing an old radio back to life after years – often decades – of storage.

Most of the techniques I'll be mentioning have been practiced and discussed in connection with the various specific radios we have restored. But I don't recall ever pulling together such material in one generic column. And so – here it is!

❖ A.C.-D.C.s Can Be Lethal!

After you blow the dust off your relic and take your first peek inside, determine if it has a power transformer. If not, you have an a.c.-d.c. set, which can be dangerous to work on – if not lethal. The problem with those is that one side of the a.c. line is generally connected to the chassis ground (though it may be connected to a ground bus separate from the chassis).

If the side of the line connected to chassis ground is the "hot side," you could easily receive a powerful shock by touching a metal part of the radio while you are in contact with a house ground (such as a damp basement floor or perhaps the case of a test instrument whose chassis is grounded via a 3-prong a.c. plug).

Of course, the idea of connecting a ground lead from the grounded test instrument to the hot chassis of an a.c.-d.c. radio is not to be contemplated! One way of avoiding this problem is to use a polarized power plug, connected so that the ground side of the line is always connected to the radio chassis.

But this technique is effective only if the outlet you are plugging into has been correctly wired. My recommendation is that you *never* take this chance, but instead equip yourself with an isolation transformer. This is simply a transformer that does not step up or step down, but outputs at the secondary the same voltage fed into the primary. You plug the primary into

the line and connect the radio's power plug to the secondary, and you now have a radio isolated from the line by the insulation in the transformer.

One source for isolation transformers is Radio Daze (www.radiodaze.com). They show a 100 VA unit with plug and receptacle already wired in for \$60.36. Alternatively, a "hard wired" 90 VA unit (has wires sticking out; you add your own plug and receptacle) is listed at \$36.17.

Another possibility would be to purchase two Radio shack 25.2 volt at 2 amp transformers (stock # 273-162) at \$10.49 each. Wire the two secondaries together; attach a plug to one primary and a receptacle to the other; and you're in business with a capacity of maybe 40 VA. That's enough to handle any "All-American Five" a.c.-d.c. set that you might run across.

❖ The Power Transformer: A Crucial Component

I did mention this last month in connection with the Philco Restoration. But if your set has a power transformer, no discussion of a vintage radio startup strategy would be complete without stressing the need to test it early on. If it's no good, it might be wise to delay the restoration until you can get a replacement – maybe from a junker set. Finding replacement transformers that match an original both physically and electrically can be difficult.

Make sure that the rectifier tube is removed from its socket so that the power supply will not be making any d.c., then plug in the set and turn it on. Connect your d.c. voltmeter between one of the rectifier plates and ground, and you should get a reading in the neighborhood of 350

volts. You should get a matching reading from the other plate.

If you've left the other tubes in their sockets, see if at least some of them are lit. That would verify that the 6.3-volt winding of the transformer is ok. If the tubes have been removed or don't seem to be lit, check across one of the tube's heater connections to see if 6.3 volts (more with no tubes in place) is present.

Finally, measure across the rectifier tube's filament connections to verify that filament voltage (usually 5 volts) is present. If everything looks good, then proceed to your next decision point – which will be how you want to handle the set's complement of capacitors.

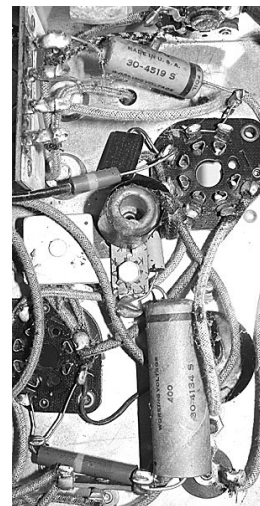
❖ To Recap or not to Recap

Here we embark upon an area that is very controversial among radio restorers. A large percentage of the problems in a vintage receiver is caused by failure of the perhaps 75-year-old paper and electrolytic capacitors. Capacitors that short out can easily destroy other, difficult-to-replace components, such as power transformers and i.f. transformers. Many of these components were manufactured very cheaply and were certainly never intended to last for decades.

Since replacements for the old electrolytic and paper capacitors are readily available, inexpensive, and a fraction of the size of the originals (very helpful on occasion), the choice seems obvious. Change out all of the old caps for dependable, modern versions.

That's the side of the fence I'm on.

However, there are others who look at it differently, and they also have a valid point of view. These folks are purists and would like their restored radios to look just as they did when they



Some restorers melt out the insides of original cardboard covered tubular capacitors like these and mount modern units within.



A small isolation transformer suitable for 5- or 6-tube a.c.-d.c. sets.

What's NEW

Tell them you saw it in Monitoring Times

Larry Van Horn, New Products Editor

FM Atlas, 21st Edition

The 21st edition of Bruce Elving's *FM Atlas* has been published. The book contains maps and directories, listings of some 10,000 FM radio stations, translators, boosters, and low power FM stations.

Included are specific listings of stations broadcasting HD Radio signals; stations having RDS data subcarriers, and other programming available to specially modified FM radios. The latter includes stations carrying reading services for the blind, and those stations broadcasting ethnic programming.

Covering the U.S., Canada and Mexico, the *FM Atlas* is 288 pages of FM information, the first such book to be published in five years. "It's all here: antenna height, power, SCA subcarrier info, and promotional catch phrases," writes Karl Zuk, ABC-TV retired, Katonah NY.

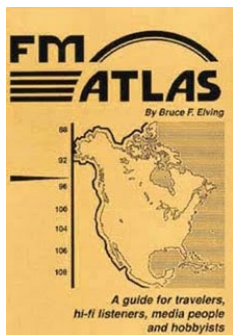
Editorial essays in the book explore the possibility of low power FM expanding into more metro areas, the encroachment of digital (HD) radio, and the virtual elimination of classical music from commercial FM.

Formats, too, are included, as are listings showing stations broadcasting in stereo and those suffering from the disease of being monophonic. All of North America is covered by the FMaps, with station listings by geography and frequency. Elving has a Ph.D. in communications from Syracuse University and published his first FM station directory in 1971. He published *FMedia!*, a newsletter, for some 20 years; it was discontinued earlier in 2010.

This book has been a mainstay in my radio shack for years. There is no other reference in the same class as the *FM Atlas*. I find the station directory, sorted by geography and frequency, particularly useful when I am DX-ing an FM band opening.

Among the major improvements to this edition are the station maps. While the maps are much cleaner, the call signs for the stations on the map are a bit smaller. So, if you have vision issues, you might need some magnification help. Still, the smaller type does help keep the cost down.

The book is priced at \$22 postpaid (checks, charge cards, money orders) from "FM Atlas," PO Box 336, Esko MN 55733-0336, by calling 1-800-605-2219, or PayPal at FmAtlas@aol.com.



New Milcom Log Periodic Now Available

Signal Design Labs Antennas in Georgia, has released a new log periodic antenna for 225-400 MHz military air band reception. The antenna is constructed of T6061 aluminum with all stainless hardware. Each of the 20 tubular T6061 aluminum elements are attached to one of the 1-inch dual T6061 booms. This installation makes for an antenna that is incredibly well built, no flimsy, whippy elements that can be easily broken as with many other hobbyist-type antennas.

The antenna is rear mounted to eliminate mast interaction with the antenna pattern. This log periodic is vertically polarized and the antenna exhibits 9.4 dBi of gain. The longest element is 26 inches and the antenna has an overall turning radius of 49 inches. Wind area is 1.4 square feet so the antenna can be turned using inexpensive TVFM antenna type rotors. This antenna comes standard with an N female RG213 pigtail connection. The boom length is 48 inches and weighs 7 pounds, so attic or limited space mounting is possible.

This new 225-400 MHz LP antenna retails for \$279.99. You can get more information on the company website at <http://kg4fvg.weebly.com/-sdl-log-periodic-antennas.html>.

SSB LAN-SDR

A new top-class receiver is now available from SSB for use on a home network. The SSB LAN-SDR from SSB-Electronics combines first class technology with modern networking components, making this new Software Defined Radio (SDR) a natural fit for remote operation. Regardless of where you are located, you can now operate this new SDR from any location with access to the LAN (Local Area Network).



This new receiver has some interesting specifications. For instance, the software package that operates the radio has a free, scalable user interface and zoom function for spectrum and sonogram displays. These can be either one large format display or both images can be visible at the same time, using a minimum screen resolution of 1152 x 864 pixels.

Recordings can be made as a narrow-band audio file; as a broad-band IF recording, or both at the same time. Two antenna inputs are select-

able by software and can be user defined in setups (memories).

A graphically scalable, double notch filter, and an API interface, for taking advantage of freeware or other available standard software, make this product applicable for a wide variety of monitoring tasks.

Technical Data (from the manufacturer)

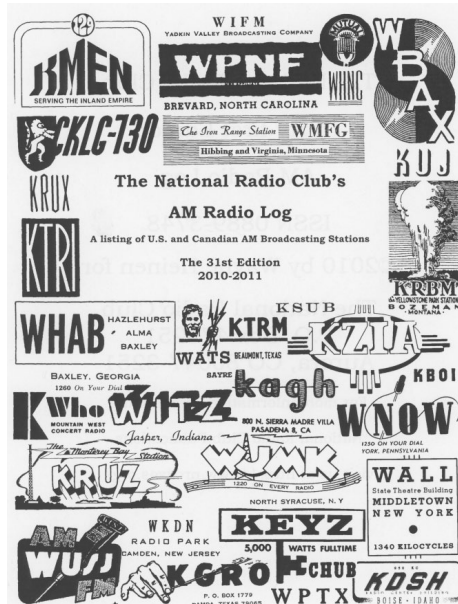
Frequency range: 0.100 kHz to 30 MHz
Dynamic range SSB: USB, 2400 Hz BW > 110 dB
Dynamic range CW: CW, 500 Hz BW > 110 dB
ADC: 16 Bit @ 66.66 MHz
IF Bandwidth: 8 kHz – 500 kHz (USB: 8 kHz – 150 kHz)
Low noise figure: 9 dB
High input sensitivity: - 121 dBm @ 2.7 kHz BW
10 dB /SNR
IP3: > 35 dBm - 40 dBm typical
Operating Systems: Windows XP to Windows 7, 32 and 64 bit systems
Interfaces: Ethernet-LAN10/100, USB 2.0

According to Willi Passmann DJ6JZ at SSB SDR-Support, this product is FCC certified and available for sale in the United States. The retail price listed on the SSB website was 2.198,00 Euros (\$2,789 U.S.), including a 19% tax. You can learn more about this product on the company website at www.ssb.de.

NRC AM Radio Log

As this issue hits the newsstand, we start the beginning of the fall/winter AM broadcast band DX season, and that band is one of my favorite places in the radio spectrum to DX. This time of year also means that one of my favorite annual radio publications will again be available for purchase – *The NRC AM Radio Log*.

Formerly known as the *National Radio Club Domestic Log*, the first edition of this annual favorite was published by mimeograph with the



stencils hand-typed in Boston by the legendary AM radio hobbyist John Callarman. Since that first edition (which I still have), the *Log* has gone from its early, crude roots to today's sleek professional publication produced by Wayne and Joan Heinen.

This 2010-2011 31st annual edition of the National Radio Club's *AM Radio Log* contains 278 pages in 8-1/2-inch by 11-inch size, 3-hole punched, loose leaf format, so that you can put it neatly into a 1-inch three ring notebook.

AM band radio stations from the United States and Canada are listed including the expanded (X-band) stations from 1610-1700 kHz. Each station entry consists of its operating frequency, callsign, location (city and state of license), time zone, antenna and transmission power, mailing address daytime telephone number, hours of operation, and broadcast format, including network affiliation. There are also cross reference listings by city and callsign, as well as a list of stations conducting AM stereo operations.

Recent additions to the log include call letters of FM simulcasts, regional groups of stations, and a cross reference of those stations that are licensed to use IBOC (In Band On Channel) digital audio, known as HD-Radio. There are nearly 10,000 new updates in this edition since the 30th edition was released in the fall of 2010.

The *NRC AM Radio Log* is available from several radio dealers as well as directly from the club website at www.nrcdxas.org for \$25.95 (non-NRC members) and \$19.95 (for members). New York residents will have to add 4% sales tax. Orders are shipped postpaid Media Rate. USA and Canada add \$3.50 for priority shipping. Canadian and overseas rates are as follows:

Canada: Member	\$24.00
Canada Non-Member	\$29.00
Outside US/Canada Overseas [Member or Non Member]	\$34.00

You can also get additional information or send orders via mail to: National Radio Club Publications, P.O. Box 473251, Aurora, CO 80047-3251.

The *AM Radio Log* is the most accurate source on AM radio stations in the United States and Canada. If you tune the AM broadcast band, you need the *AM Radio Log*. Quite frankly, no self respecting AM DXer or listener should be without this superb publication on their radio room bookshelf.

New Narrowband Mode Released – CMSK

Con Wassilieff, ZL2AFP, has recently released a new narrowband digital mode – Correlated, Convolved Minimum Shift Keying or CMSK. The new mode is designed specifically for the LF and MF ham radio bands (2200, 600 and 160 meter bands).

According to his web site, “MSK (Minimum Shift Keying) is very similar to PSK, but instead of changing the phase to signal the data bits, the frequency is advanced or retarded a very small amount (exactly half the symbol rate), sufficient to exactly achieve a 180° phase shift in one bit period. Because the resulting phase change is produced smoothly without any sudden changes in phase, the signal does not require raised cosine (amplitude) modulation or other

means of spectrum management.

“For PSK modes, such modulation must be employed to drop the output to zero at the phase change, in order to reduce the keying sidebands. The MSK spectrum is very similar to PSK, but the phase relationship between the carrier and the data is different. MSK is little used on HF, but has been widely used on LF, notably (at 100 baud and 200 baud) for DGPS beacons, and (at 50 baud and 100 baud) for VLF submarine communications.

“The huge advantage of MSK over PSK is that, because there is no amplitude information on the signal, the transmitting amplifier need not be linear. The transmitter duty cycle is always 100%, not reduced by the AM modulation. In other respects the mode is similar to PSK, and, in fact, the same receiver demodulator can be used, although a different means of recovering symbol sync is required.”

CMSK uses a full-time NASA standard convolutional coder with a generous interleaver to provide impressive QRN resistance. Synchronism is assured, even on very weak signals, by a transmitted PN-sequence frame marker and cross-correlator at the receiver.

Four modes have been provided, from 125 baud (<200Hz bandwidth, 60 WPM) down to 7.8 baud (12.5Hz bandwidth, 4WPM). The narrowest and slowest mode is intended for beacon applications, and can be received 100% at -21dB S/N in 3-kHz bandwidth. The default mode, CMSK63, has been reliably copied at a range of 2200 km on 600 meters using a power well under 1-watt EIRP.

Software for this new mode is available now from www.qsl.net/zl1bpu/CMSK/cmsk.htm

2011 Buyer's Guide

COMING SOON IN THE NOVEMBER ISSUE

Radio enthusiasts are on the leading edge of today's technology and *MT* readers want to know what's new and what's best. That's why they look to *MT*'s team of seasoned writers to give them the inside track on shortwave radios, amateur transceivers, two-way portables, scanners, antennas and everything else related to monitoring the electromagnetic spectrum. Now, in a special 16 page insert to the **November, 2010** issue of *Monitoring Times*, readers will have a concise guide to the best products available that they can refer to all year long.

All subscribers (print and *MT Express*) will receive the Buyer's Guide **FREE**. Single issues may be ordered for \$5 including first class mailing (order GUIDE2011).



Subscribe TODAY and get the Buyer's Guide FREE!



LETTERS

editor@monitoringtimes.com



Rachel Baughn

rachelbaughn@monitoringtimes.com

Feedback and Quickies

"Mr. Hangster" says, "Your magazine is the best and having it online is great. I really look forward to your new product reviews. You guys are #1."

Tom Buyea of Miami, Florida, wrote, "I am a radio and TV station engineer and aircraft avionics technician. I have spent many years on CB radio and Ham radio, shortwave listening and scanner listening (including being a police dispatcher for two years).

"I just discovered your magazine four months / 4 issues ago (although I may have seen it many years ago?) Your magazine is very good, I spend the whole month reading it.

"You manage to present a more complicated but explained version of the subjects you cover than most magazines on electronic devices, without going completely into an area that only PhDs can understand."

Thanks, Tom – You just summed up our mission statement nicely. It's good to know *MT* measures up to it!

Carole Perry had a request: "I've gotten a wonderful response to my August article about the 'History of RCA.'" So much so, that the RCA webmaster would like to put it on our web page.

We were gratified to hear folks enjoyed Carole's excellent article and were happy to give our permission. If you didn't see it, look for the article at www.radioclubofamerica.org/



City police look about the same, the world around. Harry Baughn caught this photo while he and your editor were watching a parade in Pattaya, Thailand, in June!

Kevin Asato KC6POB amended the critique from the July "Communications" column which suggests that all boats should "have an HF transceiver on board and someone in the crew with a ham license who knows how to use it."

Kevin says, "I think the point would have been better served had it said that at least one person in the crew know how to operate the radio. Using an HF transceiver for the marine bands does not require a licensed radio amateur to operate it, as it is in a different radio service. There are actually two licenses involved – a ship station license for the shipboard station (radio) and a Restricted Radio Operators Permit or better for the radio operator (www.offshorestore.com/services/selfhelp/communications/radio%20licensing%20Q+A.htm).

"Having an amateur license (General Class or better) would be a plus as there would be more bands to try and establish a call for help. I do not mind the promotion of amateur radio, but there is an established radio service in place that needs to be used properly, with amateur radio considerations being secondary in this case."

Irv Sanders K3IUY also wrote, tongue in cheek, regarding a news item in "Communications": "Just received my August issue of *MT*. In your Communications article on page 7, left column, bottom, 'Philly Councilman Tired of Looking at Dishes.' I wish you would ask the councilman if he owns /or uses a Cell Phone, and if he doesn't find those thousands of cell antennas unsightly? Just wondering."

Bob Grove sent this note: "In part 5 of my antenna series in August, at the end of page 15, an error was spotted by communications engineer David Hindin. The last paragraph should have said 'Since a typical two-way splitter is a power divider [not a voltage divider]...'

"Thanks, David, and I've corrected that same error in *Ask Bob* as well!"

Ready-Made for 160M?

Dick Robbins WB9AIS asked: "Ken: I enjoyed your recent article on ready-made loops in *Monitoring Times*. Is there available such an antenna for 160 meters by any manufacturing company?"

"I have done a pretty thorough search of all the ham-related antenna manufacturers and I haven't found anything like a 160 meter receiving loop. My search did come up with a number of plans for constructing such a loop from dozens of hams who seemed also to be looking for the product. Just Google '160 meter receive-only loop' and you'll see what I mean.

"There doesn't seem to be anyone selling

such a product and it looks like a good opening for a ham/entrepreneur. One reason that it's not possible to build a small, effective loop for 160 similar to those used for the AM broadcast band is that most commercial stations operate at tens of thousands of watts, as opposed to hams who can only go as high as 1,500 watts but may be operating with just 100 watts or even less. The broadcast stations are just that much easier to hear!

"If any of our readers know of such a commercially made loop or have had experiences building their own receive-only loop for 160, let us know!"

Ken Reitz KS4ZR, MT Staff

Pick-Up Antenna Solution

JA Moran volunteered this simple solution to mounting antennas on the prized pick-up truck without damaging the body or the paint:

"I have a 2004 F-150 longbed pickup. I had been using magnetic mount antennas; however, when I repainted the truck, I decided to build a dedicated area for the antennas. I have a 2/440 (150/450 MHz) antenna, a 27-32MHz (CB) a 6/2/440 and a 150/450/850 antenna. All are from Larsen Telley distributing and are NMO mounts.

"I bought two 8-foot 2x4's and a 1-foot section of metal channel stud (the header piece without any holes in it...)

"I built a rectangle that is 63 inches long (width of truck bed) and 24 inches tall (so as not to obstruct the rear window. The rectangle mounts behind the rear window. I threaded the coax from each antenna through an existing grommet behind the passenger seat. A ground wire is also attached to the metal channel and attached to the truck's frame

"Cost to build this was minimal."

JA Moran

Thanks, JA – Maybe this will inspire another reader to discover his own simple solution. When you build it, send us a picture and a description of how you did it!

Happy Halloween! In this month which celebrates spooks and all things weird and whacky, be sure to fully enjoy our slightly oddball hobby of radio monitoring!

Rachel Baughn

*This column is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be edited or shortened for clarity and length. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902 or email editor@monitoringtimes.com
Happy monitoring!
Rachel Baughn, Editor*

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Columnist Blogs and Web Sites

These blogs and web pages were created by some of our columnists to better serve their readers. While we highly recommend these resources, they are not official instruments of Monitoring Times.

AMERICAN BANDSCAN
<http://americanbandscan.blogspot.com/> - by Doug Smith

BELOW 500KHZ
<http://below500khz.blogspot.com/> - by Kevin Carey

FED FILES
<http://mt-fedfiles.blogspot.com/> - by Chris Parris

LARRY'S MONITORING POST
<http://monitor-post.blogspot.com/> - by Larry Van Horn

MILCOM
<http://mt-milcom.blogspot.com/> - by Larry Van Horn

SCANNING REPORT
<http://www.signalharbor.com/> - by Dan Veeneman

SHORTWAVE
<http://mt-shortwave.blogspot.com/> - by Gayle Van Horn

UTILITY WORLD
<http://mt-utility.blogspot.com/> - by Hugh Stegman
www.ominous-valve.com/uteworld.html

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US 1st Class Mail	<input type="checkbox"/> \$22.95*	<input type="checkbox"/> \$42.95*	<input type="checkbox"/> \$79.95*	<input type="checkbox"/> \$119.95*
Canada Surface*	<input type="checkbox"/> \$35.95*	<input type="checkbox"/> \$69.95*	<input type="checkbox"/> \$125.95*	<input type="checkbox"/> \$189.95*
Canada Air*	<input type="checkbox"/> \$30.95*	<input type="checkbox"/> \$58.95*	<input type="checkbox"/> \$119.95*	<input type="checkbox"/> \$179.95*
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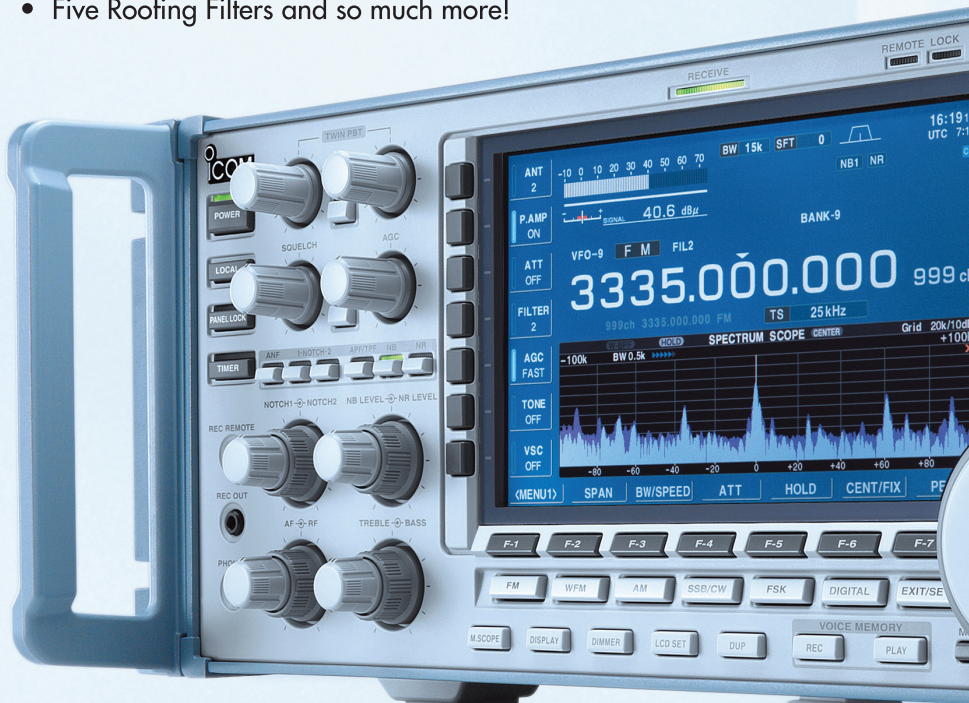
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